AMERICAN GAS ENGINEERING JOURNAL

FORMERLY

AMERICAN GAS LIGHT JOURNAL

VOL. CVIII., No. 15
WHOLE No. 3136

NEW YORK, SATURDAY, APRIL 13, 1918

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INDEX TO CONTENTS, PAGE 352 ADVERTISERS' INDEX, PAGE 20

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Vol. CVIII, No. 15 NEW YORK, APRIL 13, 1918 Whole No. 3136

The Gas Appliance Testing Laboratory—Part VII

The Instantaneous Automatic Water Heater—A Field Practically Undeveloped—The Summer Load Advantage—Convenient Removal and Renewal of Individual Parts of Prime Importance to the Gas Company

By H. M. RILEY and L. B. WILSON, JR.

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The instantaneous automatic water heater is probably the most ingenious of all the many gas appliances which are to-day available for general use. The present general form of water heater has been on the market since about 1899, but general acceptance of this device is of quite recent date, and even to-day the field for increased sale of gas by the more widespread use of this appliance might be said to be indeed undeveloped.

To one familiar with the amount of comfort and convenience afforded the possessor of a constant and unlimited supply of hot water, it is entirely superfluous to advance this, the consumer's interest in the device.

There are, however, two phases of general interest to the gas industry in increasing the use of the automatic water heater, namely:

1. The increased sale of gas.
2. The increased development of the summer load.

The gas industry as well as any electric central station, or, in fact, any industry, is most interested in raising the load factor. In the gas business it will be generally found that the winter load is considerably in excess of that of summer, and it is therefore important, in order to raise the yearly load factor, to materially build up the summer business.

In a word, then, the instantaneous automatic heater may be considered as offering large undeveloped possibilities to the gas companies, and with its complexity of construction it is therefore worthy of special attention by the testing laboratory.

Before considering the work in this connection, which might be considered as that within the jurisdiction proper of the laboratory, there are two considerations which the writers regard of such importance to the gas company that they feel that these should have mention in this article and attention possibly by the laboratory, rather than by any other department of the company's organization:

1. The unassailable position of the manufacturer as to patent rights should be verified, as great embarrassment to the company in obtaining repair parts and renewals, if not in more serious manner, may result in the recommendation of the adoption, for sale, of a heater which will not remain upon the market.

2. The proper instruction of the sales and fitting forces of the company as to conditions necessary for satisfactory results. Overtaxing the capacity of a heater or installing it improperly will unquestionably, in a measure, if not fully, nullify even the greatest care displayed by the laboratory in its selection.

In installing the automatic water heater, it is of prime importance that its location be such as to afford a proper and convenient flue connection, and that the length of the hot water line from it to the faucets to be supplied be as short and direct as possible. The gas piping and meter installation must not only be sufficient to supply the required amount of gas at the proper pressure to the heater, but must be of sufficient capacity to minimize fluctuation in the lines to other appliances supplied by the same service and meter. The general rules pertaining to fitting work must be applied and care must be exercised to insure against the creation of any strain upon the water or gas valves of the heater.

Having touched upon these allied considerations of service results let us at once proceed to the actual work of the testing laboratory.

Requirements That Must Be Met

The instantaneous automatic water heater must meet the following requirements if it is to be worthy of acceptance:

1. It must be safe.
2. Its thermal efficiency must be high.
3. It must be durable.
4. The action of the valves and thermostat must be positive and accurate.
5. Burners must be capable of operation without striking back, due to reasonable changes of gas composition or pressure, to heating of the burner or to sudden and alternate extinguishing and ignition of the flame; they must also be protected from excess corrosion.

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6. The pilot must be constructed with a view to minimizing the possibility of outage and placed to produce immediate and positive ignition.

7. Provision must be made for draining water valve and coils.

8. Ease of maintenance and repairs to and easy removal of parts must be insured.

Requirement No. 1

The feature of safety is the requirement which must have the first attention of the laboratory. This is true with any gas appliance, but especially is it the case with the instantaneous automatic water heater, because of its relatively high consumption, the concentrated nature of application of heat and the automatic nature of its operation.

The large amount of gas which the burners must pass to obtain the relatively instantaneous heating of the water demands that a large volume of waste gases as represented in the products of combustion pass from the heater without any tendency to collect within it.

It is, of course, assumed that a gas-consuming device of this description will never be installed without the proper flue connection, but it is at the same time necessary to ascertain that the exit of the flue gases will not be excessively impeded by any feature of interior design of the heater or by the operation of a back or down draft in the chimney. The effect of the down draft is generally guarded against by one of several forms of back draft check or draft regulator, which is, in some cases, incorporated in the design of the heater itself, and in others supplied as a separate feature to be utilized at the time of its installation.

Neglect in providing against the accumulation of spent gases in the heater will introduce a strong likelihood of smothering the flame which will create the direct danger of escaping live gas or the indirect danger of gas explosion resulting from an attempt to improperly light the heater.

Proper attention to ventilation in the design and installation of this appliance will lessen the danger even of the failure of ignition of gas, since under favorable conditions the gas, or a large part of it, will pass off into the outside air.

The concentrated manner in which the heat is applied to the water makes it necessary to carefully guard against the generation of steam of sufficient pressure to cause an explosion or bursting of the coils. The automatic nature of the operation of this device, with its resultant complexity of construction, imposes upon the laboratory additional necessity for a thorough analysis of the item of safety.

Some of the other requirements to be discussed have a direct bearing upon this subject of safety, as treated of in the individual features of design.

Requirement No. 2

The thermal efficiency of the instantaneous automatic water heater must be high. This condition, as a matter of fact, is met with in the standard makes of this appliance, the efficiencies running from 75 to 85 per cent. A difference of 4 to 6 per cent in the thermal efficiency is a matter of little practical consequence, and this requirement should not be regarded as of such material importance as the items of safety, reliability, durability, etc.

In view of the relatively large consumption involved in the ordinary use of the automatic water heater, the reader might hold a view as to the importance of efficiency entirely at variance with that held by the writers. However, a rough example will serve to illustrate the fact that a slight difference between two efficiencies, both of which are fairly high, is of small consequence in practical use.

Example

Assuming that the household of the gas consumer uses each day an average of 75 gal. of water, raised to a temperature of 60 deg. above its initial temperature, and that the price of 600 B.t.u. gas is $1 per thousand cubic feet. Neglecting all heat losses from the hot water piping, let us roughly calculate the yearly difference to the consumer on a dollar and cent basis between a heater of 80 per cent and one of 85 per cent efficiency.

Gallons of water heated per year $= 75 \times 365 = 27{,}375$.

Pounds of water raised to 60 deg. Fahr. $= 27{,}375 \times 8.33 = 227{,}212$ lb.

Effective heat in B.t.u. required $= 227{,}212 \times 60 = 13{,}632{,}720$ B.t.u.

Effective B.t.u. available from 600 B.t.u. gas:
80 per cent efficiency, 480 B.t.u.
85 per cent efficiency, 510 B.t.u.

Yearly gas bill:

$$\text{Heater 80 per cent efficient} = \frac{13{,}632{,}720 \times \$1}{480 \times 1{,}000} = \$28.40$$

$$\text{Heater 85 per cent efficient} = \frac{13{,}632{,}720 \times \$1}{580 \times 1{,}000} = 26.73$$

Difference $1.67

It is thus seen that in a household using a fairly large amount of hot water, a difference of from 80 to 85 per cent in the efficiency of the water heater amounts to little from a dollar and cent standpoint.

Requirement No. 3

Durability is an important requirement in the consideration of any appliance or apparatus. It depends almost entirely upon two elements, namely, proper design and proper and sufficient material. The instantaneous automatic water heater depends for its operation upon the accurate movement of several valves, the alignment of which must be maintained. The operation of the heater in practice will mean that the movement of these valves will be made many, many times during the course of a year. The weight of the heater is generally quite heavy, and it must, under ordinary conditions, be handled frequently from the time that it leaves the factory to the time it is installed and ready for use on the consumer's premises.

The above facts conclusively show that the ability of this appliance to stand up in the course of transportation and in service is a question to which the laboratory should give considerable study. Not only should the material used in its construction be of the proper qual-

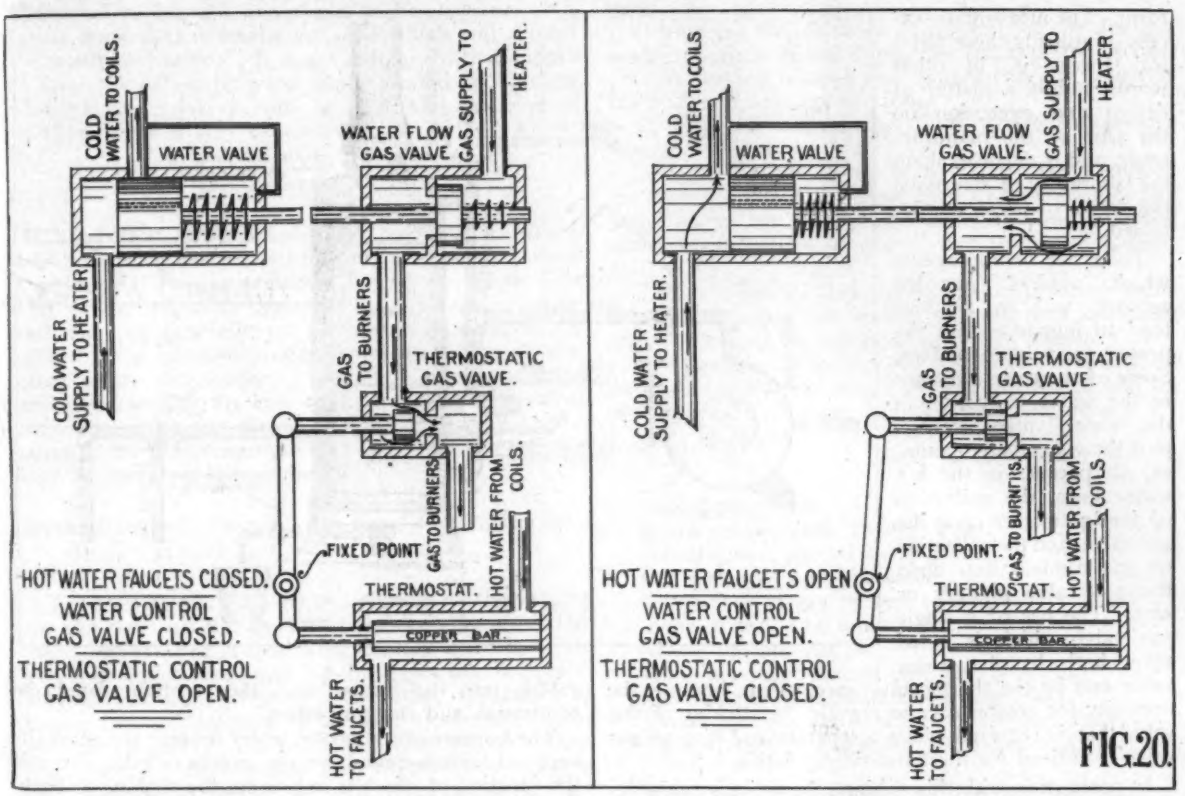


FIG. 20.

ity and weight, but it must be distributed properly in order to meet the requirements.

Requirement No. 4

The automatic feature of the instantaneous automatic water heater depends upon the action of its ingenious valve mechanism. The general action of these valves is quite similar in the different styles of automatic heaters, and may be briefly described as follows. For greater clarity diagrammatic sketch, Fig. 20, is also submitted.

When water is not flowing through the heater, the water and gas valves, both of which are of the plunger type, are held in the closed position by means of springs. The opening of a hot water faucet unbalances the water pressure against the water valve, and the water pressure being greater than that exerted by the spring, the valve is forced to move forward. During this movement the valve stem of the water valve meets the end of the stem of the gas valve, and as the water valve continues its forward motion causes the gas valve to move in the same direction, thus unseating it and allowing gas to flow to the main burners of the heater. Closing the hot water faucet creates a condition of water pressure equilibrium, and the water pressure on both sides of the water valve plunger being equal the spring causes the water valve to move to the closed position, and the pressure being removed from the gas valve stem the spring valve causes it to close simultaneously, thus cutting off the gas to the main burners.

Practically every automatic water heater, except some of those of very small capacity, is equipped with a thermostatic valve mechanism, which is designed to prevent the heating of the water passing through the heater above a certain temperature. This device is necessary as a reduction in the flow of water through the heater below that for which the heater is designed will naturally have the effect of raising the temperature of the smaller quantity of water to a point in excess of that which would be reached when the heat is applied to the normal flow capacity of the heater. The active agent in governing this maximum water temperature is the force exerted by the linear expansion of a copper tube or rod, due to the excessive temperature of the hot water with which it is kept in contact. The actual movement of the copper agent is, of course, relatively slight, but the force being exceedingly great, the movement at the gas valve is multiplied by transmitting the motion from the agent to the valve through compound levers. When the temperature of the water flowing through the heater is reduced below that for which the thermostat is set, the copper agent undergoes lineal contraction, which motion transmitted to the gas valve through the levers causes it to resume its normal position.

The foregoing description of the general principles of automatic water heater valve operation shows the principles themselves to be among the simplest of physical phenomena, and although, as has been stated, the principles are utilized by practically all manufacturers of this appliance, the design of the mechanism by which these forces are employed in the different styles of heaters will be found to show considerable variation in

form. The measure of success in utilizing these physical forces is, in other words, purely a matter of design and execution on the part of the manufacturer, and it devolves upon the laboratory to determine the degree of perfection attained.

There are several agents which, unless guarded against, will in practice tend to interfere with the proper operation of valves. Some of these are sediment in the water, corrosion in the water valve, leakage past the water valve plunger, air pockets in the hot water lines, the collection of foreign matter upon the gas valve, and the collection of gas condensation upon the gas valve plunger or seat. The use of a single gas valve which is acted upon both by the water valve and by the thermostatic mechanism, imposes the necessity for greater care to prevent the sticking of this valve than is required where a separate and distinct gas valve is utilized for thermostatic regulation.

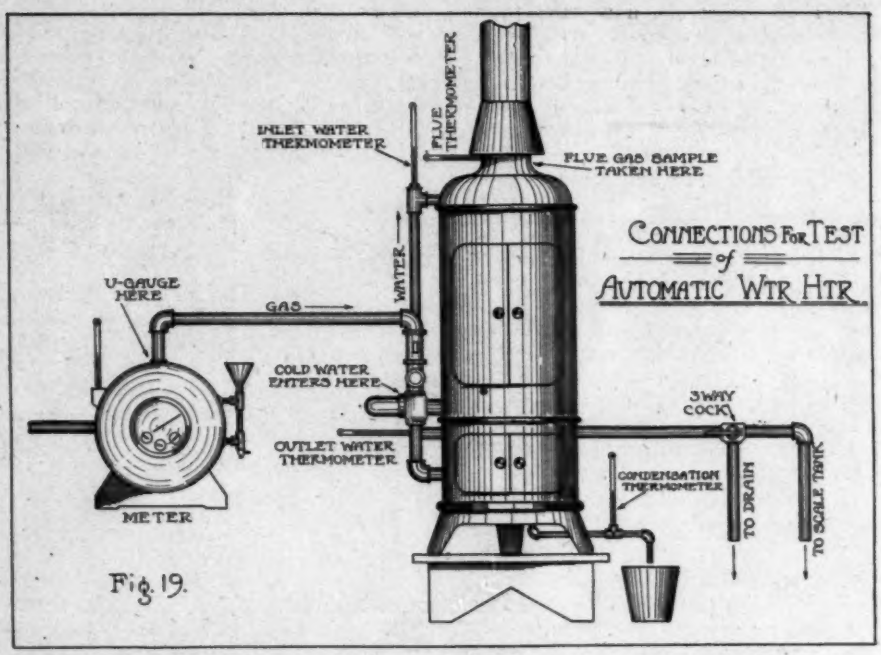


Fig. 19.

In connection with this subject, the writers again desire to call attention to the grave danger which may be created by incorporating into the design of the water valve any device which, in the event of the failure of the proper functioning of the thermostatic control, will prevent the escape of steam from the water coils back through the cold water supply lines to the heater.

Requirement No. 5

The burners of the instantaneous automatic water heater are worthy of special consideration by the testing laboratory. This may be said to apply to the burners of any gas appliance, but it is especially true with this particular appliance because of conditions of use which are peculiar to it.

It is obvious that burners must be of the Bunsen type, for the combustion must be complete, with no free carbon present, as this would, upon coming in contact with the relatively cold water coil, at once form a sooty deposit. Like any Bunsen burner, these must be capable of operation without striking back, due to reasonable changes of gas consumption or pressure, but unlike the burners of most other appliances, those of the instantaneous water heater must be designed to operate properly while heated to a high temperature and with both gradual and sudden fluctuations in the flow of gas, both upon ignition and extinguishing.

The automatic nature of the operation of the heater naturally renders a flash-back additionally serious, as this condition would not be observed.

This burner is also subjected to the corrosive effect of a large amount of the water of combustion which is decidedly acid. This water must be prevented from falling into the burner with the resultant rapid deterioration and clogging effect.

The burners of automatic water heaters are generally supplied with fine mesh copper gauzes or other devices, the function of which is to prevent the striking or flashing back of the flame already referred to, and which is termed a flame check. It is necessary that the burners of the heater be easily removable, and that the flame check be easily renewed, as this is a repair which will probably be required more often than any other.

Requirement No. 6

The pilot of this appliance is a small burner which burns independently of any control by the automatic valves of the heater, and whose function it is to ignite the gas at the main burners when it is supplied to them. This burner is generally of the luminous flame type, the flame being usually protected from the water of combustion by the shape of the burner head. This burner should be formed of some substance which will exclude the possibility of corrosion or clogging of the burner ports.

The position of this pilot with relation to the main burners must also be given consideration as failure to produce instantaneous ignition of them will create a condition of danger. The writers, some time ago, had this forcibly impressed upon them by the occurrence of an explosion in a heater under test. In this case, the pilot burner, being somewhat below the level of the main burners, ignition did not take place until an explosive mixture had accumulated within the heater. The testing laboratory is therefore cautioned to accord proper respect to this apparently insignificant and innocent feature of design.

Requirement No. 7

The laboratory must ascertain that the entire heater,

both water valve and coils, may be conveniently drained. This is of considerable importance to the consumer, as it is not unusual that conditions arise which will subject the water to freezing. It is not infrequent that failure to drain the automatic water heater caused the bursting of the water valve or coils or both, and the renewal of these parts is very expensive.

Requirement No. 8

The ease of maintenance and repair is a subject which is apt to be overlooked by an inexperienced laboratory man. This is probably due to the simple fact that during the short time that an appliance is under test there is generally no maintenance or repair required. The laboratory must, however, give particular attention to this subject. Simplicity of construction and provision for the easy and convenient removal of individual parts and their renewal is of prime importance to the gas company which undertakes to sell and keep in operation this appliance.

Details of the Testing Routine, Efficiency and Thermal Characteristics

Fig. 19 illustrates the general scheme of connections for the test and the apparatus incident thereto. The thermometers used in measuring the temperatures of the inlet and outlet water and the flue gases should preferably have 1 deg. divisions. The other apparatus, as shown and as mentioned in the case of the test on the gas iron (page 172, American Gas Engineering Journal, Feb. 23, 1918), should be of sufficient capacity and accuracy to render the data recorded during the test as near correct as desired.

The test is started by having the gas burning at or about its specified rate of consumption and water running through the coils with the prescribed number of gallons per minute. These two rates are usually designated on the heater or else in the accompanying literature. They can, however, be determined by several trial runs on the appliance in question. In any case, however, the outlet temperature of the heated water should be between 120 and 130 deg. Fahr. The inlet water temperature should be at or about room temperature, preferably in the neighborhood of 70 deg. Fahr. After a few minutes' burning, thermal conditions in the heater will have become rather constant, and at a given time the water is deflected into a tank conveniently located on platform scales. At the same time, simultaneous initial readings are taken of the laboratory gas meter, inlet water temperature, outlet water temperature, gas temperature, barometer reading, flue temperature, pressure of gas at meter and other incidental data. It goes without saying that the pilot consumption and proper adjustment of the burners are assumed to have been previously attended to. Also the tare of the tank for collecting the outlet water has been determined. Next, the following data is recorded during the time of the test proper:

1. Time (by stop watch) every minute.
2. Meter reading every two minutes.
3. Inlet water temperature every two minutes.
4. Outlet water temperature every minute.
5. Gas temperature every two minutes.
6. Flue temperature every minute.
7. Gas pressure about two or three times during the test.
8. Flue gas sample twice during test, or one flue gas sample slowly collected during the entire period of test.
9. Barometer reading and temperature are taken at the start and finish of the test.
10. Fuel gas analysis and B.t.u. determination once during or about the time of test.

After about 300 lb. of heated water have emptied into the tank, the test is concluded with observance and recording of the main items, meter reading, inlet and outlet temperatures of water, flue temperature, time, etc.

The statement of data and thermal calculations therefrom of an actual test conducted some time ago under the direction of the writers might be of interest.

For the sake of brevity, the log sheet containing the original or observed data has been eliminated and the average and summated figures taken therefrom.

Data

Barometer, 29.80.
Room temperature, 73 deg. Fahr.
Gas temperature, 70.5 deg. Fahr.
Gas pressure, 3 in. of water.
Cubic feet of gas burned (uncorrected), 37.18.
Time of test, 14.6 minutes.
Water passed, 300 lb.
B.t.u. per cubic feet of gas, 627.
Inlet temperature of water, 70 deg. Fahr.
Outlet temperature of water, 128.6 deg. Fahr.
Temperature of flue gases, 197.4 deg. Fahr.

	Fuel Gas Analysis	Flue Gas Analysis
CO^2	= 3.6 per cent	7.3 per cent
C^2H^4	= 10.2 per cent	
O^2	= 0.5 per cent	10.4 per cent
CO	= 25.0 per cent	0.1 per cent
CH^4	= 18.2 per cent	
H^2	= 37.3 per cent	
N^2	= 5.2 per cent	82.2 per cent
	Total, 100.0 per cent	100.0 per cent

Calculations

Gas consumption correction to standard conditions, 60 deg. Fahr. and 30.00 in. barometer.

Observed reading of barometer	29.80
Inches of mercury equivalent to 3 in. of water	0.22
	30.12

Reduction for temperature of 73 deg. Fahr., 0.72.
Hence corrected pressure is 30.00.
Correction factor for a gas temperature of 70.5 deg. Fahr., and a barometer reading of 30.00 is 0.973.
Therefore, corrected gas consumption is

$$0.973 \times 37.18 = 36.18 \text{ cu. ft.}$$

Determination of Flue Gas and Excess Air

Carbon in Fuel Gas

$CO^2 = 1.857 \times 3/11 \times 0.036 = 0.018232$ oz.
$C^2H^4 = 1.195 \times 6/7 \times 0.102 = 0.104477$ oz.

$CO = 1.195 \times 3/7 \times 0.250 = 0.128036$ oz.
$CH^4 = 0.678 \times 3/4 \times 0.182 = 0.092547$ oz.

Total carbon in 1 cu. ft. $= 0.343292$ oz.
Carbon in 36.18 cu. ft. of fuel gas $= 12.420305$ oz.

Carbon in Flue Gas

Assume "a" cubic feet of flue gas—
$CO^2 = 1.857 \times 3/11 \times a \times 0.073 = 0.036971\ a$ oz.
$CO = 1.195 \times 3/7 \times a \times 0.001 = 0.000512\ a$ oz.

Total carbon in flue gas..... $= 0.037483\ a$ oz.
$0.037483\ a = 12.420305$
$a = 331.36$ cu. ft. of dry flue gas.

Hence, supplying our flue gas analysis percentages we obtain:

$CO^2 = 24.19$ cu. ft.
$O^2 = 34.46$ cu. ft.
$CO = 0.33$ cu. ft.
$N^2 = 272.38$ cu. ft.

Total, 331.36 cu. ft. of dry flue gas.

With this data we are now able to tabulate the combustion table.

By averaging the three we find

171.85
173.56
164.41

$\frac{509.82}{3} = 169.94$ cu. ft. of excess air.

This 169.94 cu. ft. consists of 134.32 cu. ft. of nitrogen, 35.62 cu. ft. of oxygen. Hence the nitrogen content in the flue gas is as follows:

135.20 cu. ft. from combustion table.
134.32 cu. ft. from excess air.

269.52 cu. ft.

Our readjusted flue gas will now show:

$CO^2 = \frac{23.98 + 24.19}{2} = 24.09$ cu. ft
$O^2 = \frac{35.62 + 34.46}{2} = 35.04$ cu. ft.
$CO = 0.33$ cu. ft.
$N^2 = \frac{272.38 + 269.52}{2} = 270.95$ cu. ft.

Total ..... 330.41 cu. ft.

COMBUSTION TABLE

Constituent	O^2 Required	Air Required	CO^2 Formed	CO Formed	H^2O Formed	N^2 Given Off
$CO^2 = 1.30$ cu. ft.	....	....	1.30	....	....	....
$C^2H^4 = 3.69$ cu. ft.	11.07	52.80	7.38	....	7.38	41.73
$O^2 = 0.18$ cu. ft.	—0.18	—0.86	....	....	....	....
$CO = 9.05$ cu. ft.	4.36	20.84	8.72	0.33	....	16.48
$CH^4 = 6.58$ cu. ft.	13.16	67.77	6.58	....	13.16	49.61
$H^2 = 13.49$ cu. ft.	6.75	32.24	....	....	13.49	25.49
$N^2 = 1.89$ cu. ft.	....	....	....	....	....	1.89
Total, 36.18 cu. ft.	35.16	167.79	23.98	0.33	34.03	135.20

It will be noted in the above table that we have assumed that the 0.33 cu. ft. of CO as shown from the flue gas analysis is the result of only $9.05 - 0.33 = 8.72$ cu. ft. of the CO completely burning.

Upon retabulating we obtain the following:

$CO = 0.33$ cu. ft.
$CO^2 = 23.98$ cu. ft.
$N^2 = 135.20$ cu. ft.

159.51 cu. ft.

of dry flue gas (as per combustion table) with no excess air accounted for.

Now, since we have found the total dry flue gas to be 331.36 cu. ft., the following obtains:

331.36 cu. ft.
159.51 cu. ft.

171.85 cu. ft. of excess air.

However, on the nitrogen basis we obtain

$\frac{272.38 - 135.20}{0.7904} = 173.56$ cu. ft. of excess air.

Also on the oxygen basis we obtain

$\frac{34.46}{0.2096} = 164.41$ cu. ft. of excess air.

EFFICIENCY CALCULATIONS

Sensible heat in fuel gas:

H^2, N^2, O^2, $CO = 24.61$ B.t.u.
$[0.0189 + 0.0000009\ (70.5 - 60)]\ (70.5 - 60) = 4.91$
$CO^2 =$
$1.3\ [0.023 + 0.000008\ (70.5 - 60)]\ (70.5 - 60) = 0.33$
$CH^4 = 6.58$
$[0.0237 + 0.000008\ (70.5 - 60)]\ (70.5 - 60) = 1.70$
$C^2H^4 = 3.69$
$[0.0287 + 0.000008\ (70.5 - 60)]\ (70.5 - 60) = 1.14$

Total sensible heat in gas..... 8.08

Sensible heat in air for combustion and excess:

Cubic feet of air as per combustion table ..... $= 167.79$
Excess air ..... $= 169.94$

Total air supplied (cubic feet) $= 337.73$

Sensible heat supplied in air equals
$333.73\ [0.0189 + 0.0000009\ (73 - 60)]\ (73 - 60) = 82.03$ B.t.u.

Heat of Combustion of gas equals
$36.18 \times 627.0 = 22{,}684.86$ B.t.u.

Heat imparted to water:
Heat in 300 lb. water at 128.6 deg. Fahr. = 28,947 B.t.u.
Heat in 300 lb. water at 70 deg. Fahr. = 11,418 B.t.u.

Total heat added to water..... = 17,529 B.t.u.

$$\text{Efficiency} = \frac{17{,}529 \times 100}{8.08 + 337.73 + 22{,}684.86} = 76.1 \text{ per cent}$$

Flue, Radiation and Other Losses

Sensible heat in flue gases:

	B.t.u.
O^2, N^2, CO = 306.3 [0.0189 + 0.0000009 (197.4 — 60)] (197.4 — 60)	= 800.46
CO^2 = 24.1 [0.023 + 0.000008 (197.4 — 60)] (197.4 — 60)	= 79.80
Total	880.26

Heat of combustion loss due to incomplete combustion of CO gas:

$$342 + 0.33 = 112.86 \text{ B.t.u.}$$

Total heat lost in flue gases:

$$880.26 + 112.86 = 993.12 \text{ B.t.u.}$$

$$\frac{993.12 \times 100}{23{,}030.67} = 4.3 \text{ per cent}$$

Other Losses

It will be noted that no account has been taken of the water formed by the burning gas, and in this connection it might be mentioned that since the flue temperature is quite appreciably lower than 212 deg. Fahr., but very little of the moisture makes its exit with the flue gases. Hence we have assumed that the entire 34.03 (see combustion table) cu. ft. of moisture finds its way to the drip pan in the bottom of the heater in a liquid condition:

$$34.03 \times 0.0478 = 1.63 \text{ lb. of water.}$$

The temperature of this condensate as it drops into the drip pan will be about 120 deg. Fahr.

In cooling from 120 deg. Fahr. to 60 deg. Fahr. each pound of the condensate will give up 59.83 B.t.u.

Hence $59.83 \times 1.63 = 71.12$ B.t.u. equals heat in the water of combustion:

$$\frac{71.12 \times 100}{23{,}030.67} = 0.3 \text{ per cent.}$$

Therefore, the other losses (radiation, etc.) equal

$$100 - (76.1 + 4.3 + 0.3) = 19.3 \text{ per cent.}$$

Note—It is not strictly correct that all the water due to combustion finds its way to the drip or condensation pan in the bottom of the heater. However, in conducting the test, one can collect and measure the water and deduct the amount found from the total water evolved, and the difference can be figured as passing from the heat via the flue. Also it is likely that about one-half the water passing from the flue will be in a vaporous state and the other half in a condition of finely divided mist.

Faucet Efficiency

It will be generally recognized that, although an instantaneous water heater has a high thermal efficiency, the customer does not enjoy the full benefit of such. On the contrary, except where large quantities of water are used, the amount of gas consumed in the heater per unit of water heated is rather great. Let us attempt briefly to substantiate this statement before proceeding with a numerical example and suggested methods for testing out this feature of the instantaneous water heaters' operation.

As a general proposition, those times during the day when hot water is drawn from the spigot in small quantities will be at least equal in number to those when the hot water is drawn in comparatively larger bulks. That is to say, there will be a number of times in the course of the day when hot water in gallon quantities or less will be required. For example, shaving, face and hands washing, and the like will demand but little more than 1 gal. of 120 deg. Fahr. water for each. Pursuing the line of argument still further, we can appreciate the fact that when we desire a gallon of hot water for some purpose we will have to let from a gallon to a gallon and a half of cold water run from the faucet before the hot water appears. This is so because there is stored up between the faucet and the point where the cold water enters the heater from one to one and a half gallons of water in the coils and water piping. Incidentally, during the passage of this preliminary gallon or gallon and a half increment, the gas has been burning. A mathematical example will possibly serve to impress the point in question more forcibly upon us. Assume a heater of 4 cu. ft. per minute consumption:

Rate of flow of water, 4 gal. per minute.
Calorific value of gas, 600 B.t.u. per cubic foot.
Capacity of piping and coils, 1½ gal.
Water needed, 1 gal. at 120 deg. Fahr.
Initial temperature of water, 60 deg. Fahr.

Problem—to calculate faucet efficiency:

$$\text{Time gas burns} = \frac{1 \text{ gal.} + 1.5 \text{ gal.}}{4 \text{ gal. per min.}} = 0.625 \text{ minutes.}$$

$$\text{Gas consumed} = 0.625 \text{ min.} \times 4 \frac{\text{cu. ft.}}{\text{min.}} = 2.5 \text{ cu. ft.}$$

$$\text{B.t.u. used} = 2.5 \times 600 = 1{,}500.$$

B.t.u. in hot water drawn =

$$1 \text{ gal.} \times 8\ 1/3 \frac{\text{lb.}}{\text{gal.}} \times (120 - 60) = 500 \text{ B.t.u.}$$

$$\text{Faucet efficiency} = \frac{500 \times 100}{1{,}500} = 33.3 \text{ per cent.}$$

On the other hand, the thermal efficiency of the heater $= \frac{1 \text{ gal.} \times 8\ 1/3 \text{ lb.} (120 - 60)}{600 \times 1 \text{ cu. ft.}} = 83.3$ per cent.

A test of this nature, which will furnish valuable practical information for the salesman and high bill adjustor, can be carried on as follows:

An instantaneous water heater of popular size, say, one delivering 4 gal. per minute with a gas consumption of about 4 cu. ft. per minute, is connected up with sufficient run of water piping so that the volume of water contained in the coils and piping amounts to about a gallon and a half. Inlet and outlet water thermometers are placed on the heater and there is also installed a thermometer at the extreme end of the water piping. Near the end of the piping is located a three-way cock which supplies, in one of its positions, a calibrated receptacle so that the gallon and a half mark can be easily read, and in its other position a receptacle located on scales. The heater is lighted and water started run-

of varying gas quality are even more significant. The efficiency of the gas mantle depends upon the temperature which it reaches and extremely small changes in temperature make very great changes in light productions. The temperature obtained by the mantle is conditioned by many factors, principally the temperature of the flame, the velocity of combustion products through the meshes of the mantle, the extent to which the flame fills the mantle, the proportion of primary air entrained and the speed of flame propagation. All of these factors are markedly influenced by changes in the chemical constitution of the gas.

Notwithstanding the improved service conditions and the greater efficiencies which we may expect will result from decreasing calorific values, there lies in the present widely extended use of the open flame burner the possibility *that the proposed change may strike the gas-lighting industry perhaps the most serious blow it has ever received* unless the obvious means of forestalling this effect and turning the condition to our advantage is applied, *i. e.*, modernizing the consumer's equipment.

We are not all agreed as to the magnitude of the lighting part of our business, and no doubt it does vary rather widely in different cities, depending for the most part on the time spent on this end of the business by the new business departments.

Estimates of the proportion of the lighting load vary from 50 per cent down to 33 1/3 per cent, and a few gas companies have estimated as low as 25 per cent.

It is hardly necessary to call attention to the great importance of retaining and expanding the lighting business. This desirability lies not only in the fact that it is in the mind of the public the most striking and important use of gas, but in the fact that the loss of this business would constitute a serious menace to the integrity of most companies.

Reduction in Light Output

That the usefulness of gas in open flame burners will be greatly decreased by the proposed reduction in calorific value needs no argument. It is, therefore, worth calling attention to the fact that the magnitude of this depreciation is inadequately represented by comparisons of gas candle-power tests of the Argand burner. In cases of 20 candle-power, or over, the gas candle-power in the open flame burner is likely to be substantially equal to that in the Argand burner. With gas of lower candle-powers, however, the light output per cubic foot of gas through the open flame burner is likely to be not more than 50 per cent of that in the Argand burner.

It is difficult to determine just what proportion of the consumer's lighting is actually dependent on open flame burners; but in many of the cities where electricity is quite widely used for lighting, the gas companies estimate that as high as 40 per cent of the gas sent out is used for lighting, and that 33 1/3 of this is burned in open flames, or a total of 13 1/3 per cent of the entire output goes through open flame burners.

Very recently it became important for a large gas company in New England to get a fairly close estimate of the proportion of their output consumed in open flame burners. To obtain this, they picked out 200 average consumers and made an actual survey of the appliances, open flames and incandescents, used, and estimated the length of time each was used. Based on this information, they finally figured that 12½ per cent of their total output was used in open flame burners.

Consumption

Under the conditions of gas service prevailing before the inauguration of the calorific value standard, and in cities where even under the calorific value standard gases of relatively high open flame candle-power are furnished, the substitution of small upright incandescent units with a consumption of not over 2 ft. each for the five open flames with 1,186 hours' burning (19½ hours per day times 365 days) would give a consumption of

2,372 ft., against the open flame consumption of 7,118 ft., or a total saving of 4,746 ft.—an amount quite adequate to purchase all mantles required and leave a substantial net saving to the customer, not to mention the increase in quantity and quality of his illumination.

It should not be overlooked that in our hypothetical case we have saved 4,746 ft. of gas from illumination use which is badly needed for other purposes, and which the gas company can readily market.

What to Do with the Saving

The great decrease in open flame candle-power which will be in evidence in the next year or so will greatly accentuate the value of incandescent lighting to the customer. As an average condition it might be estimated that the value of gas in open flame burners will be depreciated by at least 50 per cent. This will make it necessary for the customer to provide twice as many outlets or, as is more likely to be the case, use the larger open flame burners, consuming 10 to 12 cu. ft. of gas per hour. At all events the saving in gas by the use of the incandescent burner will be increased from the usual four-fifths to about nine-tenths. The latter figure is based on an average open flame candle-power of 10 candle-power per 5 cu. ft., or 2 candle-power per foot, as against 20 candle-power per cubic foot for the incandescent lamp.

The reduction in gas candle-power will ultimately, and probably rapidly, force out the use of obsolete lighting equipment which has been the bane of the gas industry during the past twenty years. Whether this result will be attained through replacement by incandescent gas lamps or by the installation of equipment utilizing other illuminants, will depend largely upon the extent to which the gas industry sees its opportunity and embraces it.

Reluctant Even to Get Something for Nothing

Experience has shown that even where gas companies have offered incandescent burners free to those who make application for them, the response of the public is not what would be expected in view of the importance of the economy to them. Just as the average man, though realizing fully the value of life insurance, will not embrace even the most attractive opportunity to obtain insurance unless it is accompanied by persistent solicitation, so it seems that the protection of the interests of the consumer will involve not only a liberal policy on the part of the gas companies, but aggressive action to make this policy effective. Herein lies a tremendous opportunity for the gas industry to expand and protect its gas-lighting business.

Campaigns

At the present time, in view of the unsatisfactory financial situation and the burdens laid upon public utilities, either in the way of war service or other unusual activities, the question of obtaining funds and man power for the inauguration of business-getting campaigns, is, in many cases, a serious one. The opportunity presented is so excellent, however, that every gas company whose conditions will permit should feel encouraged to exert exceptional activity in the merchandising of gas-lighting appliances at the present time. It will not only tremendously strengthen the position of the company in the future, but, by temporarily decreasing the consumption of gas, will release for other purposes a large amount of gas now wastefully used.

In case gas companies are not so situated as to undertake aggressive merchandising campaigns of this character, it is possible now, as in the past, to obtain the co-operation of the manufacturers of lighting appliances. Manufacturers of appliances, who are particularly merchandising concerns, are not under the necessity of adopting the quite conservative attitude which properly pervades a public utility organization, and can embark in undertakings containing an element of risk with much less perturbation than can public utilities.

During the last few years gas-lighting manufacturers have, with increasing frequency, been conducting merchandising campaigns on behalf of the gas companies, accepting practically all the risks involved and furnishing in many cases the entire organization, the only unusual activity on the part of the company being collections.

However, when all is said and done, there is no doubt but that this work should be carried on when possible by the gas company itself.

An aggressive campaign to retire the open flame burner as soon as possible, offers an opportunity to replace not only an obsolete burner, but, in many cases, fixtures of a character which have reflected discredit upon the gas-lighting industry, and also to improve illumination condition in accordance with modern methods and ideas and thus enhance the prestige and appreciation of gas lighting in the eyes of the public. It would be impossible to find a condition which more completely lent itself to the expansion of the gas-lighting business; but, no matter how completely the replacement of open flame burners might be effected, the advantages accruing would be temporary and futile without effective maintenance of gas lamps.

Conclusion

Gas lighting is just beginning to feel the effects of the war through the increased cost of material and labor and the necessity of the Government for high explosives, all of which has required a reduction of the candle-power and heat units in the gas. This reduction in the heat value and candle-power of the gas is now beginning to effect gas lighting very adversely by cutting down materially the candle-power of open flame burners.

There are in place in New England at least two open flame burners to every mantle burner, and at least one-third of these are in use, so that gas lighting is still judged to a great extent by the performance of the open flame burner.

On the other hand, the changes in the manufacture of gas will benefit the working of the incandescent mantle gas lamp, and the gas companies are now offered a most glorious opportunity to improve and expand their gas lighting by replacing that part of their consumers' lighting equipment (now made very much less efficient and almost unusable) with modern and economical equipment and with this high efficiency kept up by maintenance.

There is apparently to be but one outcome, for we know if we do seize our opportunity we will greatly assist our Government, our customers and incidentally ourselves.

AMERICAN GAS ENGINEERING JOURNAL

FIFTY-NINTH YEAR

Published Weekly by
AMERICAN GAS LIGHT JOURNAL, INC.
42 Pine Street, New York, N. Y.

ELBERT P. CALLENDER, *President*
STANTON G. KRAKE, *Vice-President*
FREDERICK A. SOUTHWORTH, *Secy-Treas.*

EUGENE C. MILES, *Editor*

Subscription $3.00 per year, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines.
In Canada, $4.00 Foreign, $5.00
Single Copies, 10 Cents.

WESTERN MANAGER
E. B. FRITZ

CHICAGO OFFICE
537 So. Dearborn St.

Entered at the Post Office, New York City, as Second Class Matter.

CONTENTS

THE GAS APPLIANCE TESTING LABORATORY, PART VII. By H. M. RILEY AND L. B. WILSON, JR. 341

DEVELOPMENTS OF THE PAST YEAR AFFORD BEST OPPORTUNITY EVER PRESENTED TO GET RID OF THE OPEN FLAME BURNER..... 349

EDITORIALS 352

HOW THE GAS COMPANIES ARE HELPING THE NATION 354

MERCHANDISING GAS 357

NECESSARY TO DEAL WITH DOMESTIC HEATING AS A MAJOR BRANCH OF COMMERCIAL DEPARTMENT ACTIVITIES IF MAXIMUM SALES ARE TO BE EXPECTED. By W. H. SCHOFIELD..... 357

NEWS OF THE GAS INDUSTRY..... 361

ANNUAL MEETING OF THE PENNSYLVANIA AND NEW JERSEY GAS ASSOCIATIONS..... 361

PERSONAL NOTES 364

SOCIETIES AND ASSOCIATIONS—PAGE 15 OF ADVERTISING SECTION

CONSTRUCTION NOTES—PAGE 15 OF ADVERTISING SECTION

Something for Nothing

Many of us who sternly resolved upon grim sacrifice and bought Liberty Bonds of the first issue on easy payments have come into possession of our bonds and have discovered that we made no sacrifice at all, and, in effect, have gotten something practically for nothing.

This is due to the carelessness in handling small sums of money that has been inherent with us. There were many, on salary, who could not see where the money to meet their installments was to come from. They were living up to the very limit of their incomes. But they had to get it somehow. Some chose to patronize less expensive restaurants at lunch time, others readjusted their smoking appropriation—employed the pipe to a greater extent and eliminated or cut down on cigarettes and cigars, and so on. The year passed and they found that the things they had done without had denied them nothing in comfort, health or happiness. But the bonds were there, very real, very tangible; an investment—though we do not believe the average purchaser views them in that light—very soothing to the restless spirit of the man who would like to be in France but knows he shouldn't be.

We who are at home have not begun to sacrifice as yet. We have merely regulated, and, aside from the property we have acquired thereby, are better off for it.

We bought an amount of the first issue that we thought would stagger us in handling. We purchased an equal amount of the second issue, and the burden we thought we were assuming has proved no burden at all. We haven't yet had to dig into the *real* things, and if we take an equal amount of this third issue we will still not have to. We will be able to handle our obligations on the savings from the elimination of the unnecessaries.

But none of us here at home, even if we are past seventy, can ever be really satisfied with ourselves unless the war is costing us something. Unless we feel the realities, a portion of the hardships, we can never feel that the winning of the war means something to us, and unless it does we will reap our punishment—a bitter one, too—in the years to come, in the shame we will feel in the presence of those who went forth with guns on their shoulders to really know what sacrifice means.

If your subscriptions to the former issues were not sufficient to compel you to give up things that it would have been a real hardship for you to deny yourself, double your subscription to this third issue. If every other subscriber to the first issue adopts the same course it may be the last we will hear of "Liberty Loans" for some time to come. Do not wait

for the last minute. Enter your subscription now. Act while the thought is fresh in mind.

A Question of Ethics

At a recent association convention a speaker quoted figures revealing the total property damage from fire losses due to gas and electricity. Another speaker took issue with him on the wisdom of revealing such figures, and suggested that the gas and electric industries should co-operate to prevent the publication of such data.

We do not think any gas man present gave a second thought to this suggestion. Whether or not it is one the electric industry should follow is aside from the question. But insofar as the gas industry is concerned, to do so would be little short of criminal.

The fire losses due to gas, incidentally, are relatively small—a little short of a million dollars throughout the whole country. They are classed as strictly preventable. Consequently, the best possible means of practically eliminating them is by *widespread publicity*. Doubtless they are in part due to defective appliances or defective piping—both, in the general sense, matters outside of the gas companies' control. The bulk of them, however, are due to individual carelessness, and the best means of making John Jones more careful is to let him know that through similar carelessness John Smith had his house burn down.

It is absurd to endeavor to keep locked up in the recesses of our own minds the fact that gas or electricity if handled recklessly will cause fires. Raw fuel will do the same. So will oil fuel, etc. We are not operating in Mexico, Russia or China, where the great mass of the population knows only what it is told, and that only for a short time. Men who have never set a foot in a gas or electric plant are thoroughly versed in the dangers that may exist in these developments of our developing civilization. They know they can be made as safe as a new-born chick, if handled with ordinary common sense and very reasonable precautions. They also know, but do not think of it so often, that they can be very deadly if left to run wild.

The best way to prevent this is to keep John Jones thoroughly informed of the consequences James Smith suffers from carelessness similar to that which John is guilty of every day in the week perhaps.

Publicity never hurt anyone who didn't have an evil purpose up his sleeve. The man who is doing

his best, but sometimes, through no fault of his own, falls short, is strengthened rather than weakened in the esteem of his fellows by having his every act brought to their attention.

Correspondence

Value of Close B.t.u. Control Many Times the Cost of Obtaining It

SIR: I have just been looking over my copy of the AMERICAN GAS ENGINEERING JOURNAL, and my attention was particularly attracted by Mr. Howard's article, issue of March 23, page 265. We have found that occasional tests on the gas are of very little value in controlling the consumption of oil in water gas. We are now making somewhere around 7,000,000 cu. ft. of water gas per day, and the value of the oil consumed daily is close to $2,000 a day. It is very readily apparent that an increase in efficiency of one-half of 1 per cent will contribute a considerable sum towards the expense of having careful B.t.u. tests made throughout the twenty-four hours. To control the heating value of our water gas, we make a B.t.u. test not less than once per hour, and the result of this test is immediately transmitted to the foreman on duty at the generator house. At the same time he gets a figure on his make per run, and his oil per thousand for the period, so that he is able to constantly keep in touch with the final result of his operation and loss of oil by an excessive B.t.u. is quickly caught and eliminated.

In case, for any special reason, the quality of the gas is difficult to control or the machines are out of balance, we make B.t.u. tests as rapidly as they can be taken for as long as is necessary to assist in getting the machines back in operation, and also, if the occasion arises, make consecutive analyses of the water gas. We find, of course, that the value of this close control is many times the cost of obtaining it.

WALTER M. RUSSELL,
Chemical Engineer, Providence Gas Company, Providence, R. I.

$12,000,000,000 in Life Insurance Written by Government

More than $12,000,000,000 of insurance upon the lives of members of the military and naval forces of the United States has been written by the Bureau of War-Risk Insurance of the United States Treasury.

A year ago the total amount of life insurance in force in the United States was about $22,000,000,000. In a few months the United States Government has written more than 50 per cent of that amount.

It furnishes this insurance to the beneficiaries at the same rate that private companies would furnish it in times of peace. This insurance is bought and paid for at regular rates by the beneficiaries, except that the nation assumes the additional risk that being in the military and naval service of the country entails upon the beneficiaries.

How the Gas Companies Are Helping the Nation

A. C. ORVIS, formerly of the publicity department of H. M. Byllesby & Company, is a sergeant in the headquarters company, 313th Engineers, Camp Dodge, Iowa.

F. A. C. TOCQUE, formerly connected with the sales department of the Louisville Gas & Electric Company and the Fort Smith Light & Traction Company, has joined the British military forces.

E. K. MACDONALD, formerly of the bond department of H. M. Byllesby & Company, Chicago, who has been in the Aviation Section of the Signal Corps since last summer, has been appointed first lieutenant.

JOHN M. WATT, a former employee of the Omaha Gas Company, Omaha, Neb., who is serving the country in the United States Navy, writes the following letter to the members of the Omaha Section of the National Commercial Gas Association.

"MY DEAR FRIENDS: For a long time I have been trying to write to you.

"Since leaving Omaha, I have had some very good times and have enjoyed the very best of health. Gained in weight from 160 lb. to 184 lb.

"It is now almost a year since the war started and in that time I have had more training than in my regular navy life, served in time of peace.

"I thought I had learned discipline when I had finished the navy, but now as I look back to those years I find that I did not take navy life seriously, for little did I dream that we would have war.

"To-day it is different, and I know discipline and all its meanings so well that I can parse it and spell it forwards and backwards.

"I have taken all the grades in the commonest of all common schools. My instructors were Professor Adversity, Professor Difficulty and Doctor Discipline, and I found them the most capable teachers.

"I was a freshman, then a sophomore, a junior and a senior in the University of Experience, where the college colors are always black and blue, because the lessons are learned by hard knocks.

"I have learned obedience by the things that I have suffered, and had the conceit taken out of me by being knocked down.

"Now, my friends, I do not want you to feel that I am doing any more for our country than you are, for it is just as important that you do your work as best you know how, as it is for me to give the best that is in me.

"If you should leave any gas leaks, you endanger the loss of life to others, which is the most important thing that must be avoided.

"Whenever a person is found dead or overcome by gas, whether an accident or intentional, you will find that the gas company is blamed, and that the electric light company finds another new consumer for lighting.

"We should not forget the initial cost of the leak. First, no matter how small the leak may be, in an hour,

day or week many feet of gas have escaped, which costs labor, time, coke and oil to make. Second, the leak must be repaired, which takes away the profit from the work.

"Here in the navy it makes no difference how small the leak of steam may be, it is repaired and stopped at once, for if let go it would cause an explosion when under a full head of steam. Steaming pressure in the navy is 250 lb., with twelve to twenty-four boilers all connected to the main steam line. You can readily see that an explosion would cause the loss of life in the one fire room, for the steam from all these boilers travels to the point of explosion, for there would be the least resistance.

"We have to make our own fresh water when out at sea, and it takes 7 lb. of coal to make a gallon of water. We use only fresh water for our boilers, so each leak of steam in the course of the day means so many gallons of water wasted; also the coal consumed in taking the salt out of the sea water.

"I would like to tell you of many interesting things that I have seen and know, but we must not let any word leak out, even to a friend, for that friend, or even one of your own family, not knowing, might tell a friend who let it be generally known, until it reached an enemy. In such a case, it might be the cause of a ship being torpedoed and many lives lost.

"I have told you of these three leaks, which are small at first, but should not have been at all, so I say to you, a leak is a very dangerous thing, and should be avoided and stopped at once. No time like the present, so stop the leak now for to-morrow it may be too late and the damage done.

"Coke is made from coal and some of our ships burn coal and some oil, so in avoiding leaks at all times you are doing your bit by saving coal and oil, both of which are very important factors in helping to win this war.

"Some time in April the third Liberty Loan will be launched, so those of you who can afford, invest in one of these bonds. They pay better interest than a bank, and are the safest investment you can make.

"I used to kick and grumble when taken off the truck for a day or so and sent on non-payments or sent on complaints; but now, as I look back, I see what a blessing it is to be able to do that work, and after the war is over I think the kick will be missing.

"Boys, I am telling you the truth when I say that over in Europe it is not the same as it was when I was there before the war. The smile that was there is gone now. Every one is serious, and they have given all they had for the noble cause of a victorious peace, which is sure to come for the Allies and Uncle Sam.

"After this war, I will be able to tell you things that I cannot tell you now, and I do wish it would soon be over, for every hour lives are lost and men made cripples for life.

"I would like to write to each one of you, but most of my time is taken up so my bit in writing will have to be the little bit and you must tell the others that I am well and happy.

"I will always be glad to hear from any one of you, and I promise that as soon as possible I will answer each letter.

"To those of you who may be ordered abroad as soldiers: Remember that the honor of the United States Army depends upon your individual conduct. You will have a task to perform which will need courage, energy and patience. Be on your guard against excesses. You will find temptations in both women and wine. Resist both and do your duty bravely. Fear God. Honor the President.

"With best wishes to each and every one of you and your families, I am,

"Ever yours,

"(Signed) JOHN M. WATT."

H. W. STEELE, superintendent of the El Reno Division of the Oklahoma Gas & Electric Company, has been appointed local chairman of the Military Training Camp Association.

THE OKLAHOMA GAS & ELECTRIC COMPANY, El Reno Division, is advertising an offer to list all vacant lots which owners are willing to donate for war gardens and to distribute the lots to applicants. In this connection the company is also behind the movement to have the proceeds from such war gardens invested in Thrift Stamps. One of the company's recent advertisements says: "Are we ready to organize a Vacation Thrift Society; forego a vacation trip this summer and invest the

cost of it in Thrift Stamps? Can we consistently spend our time and money on pleasure vacations and expect the boys in the trenches to stick on the job? Before we 'see America first,' let's first 'free Armenia first, and Belgium, too.'"

THE LYNN GAS & ELECTRIC COMPANY, of Lynn, Mass., has made arrangements whereby the executive committee of the war savings stamps and thrift stamps committees meets in the office of the company to report their aggregate sales. At a meeting held March 20 the reports from various sources where stamps are being sold in Lynn showed that up to that time sales amounted to $60,631.77.

JAMES BROWN, of the Chicago office of H. M. Byllesby & Company, has enlisted in the Gas Bomb Division of the Ordnance Department.

ELMER DOVER, vice-president of H. M. Byllesby & Company, with headquarters at Tacoma, Wash., has been appointed general chairman of the Third Liberty Loan Campaign for the district of Tacoma.

C. G. ENGSTROM, of the Hutchinson, Minn., Division of the Northern States Power Company, formerly a captain of the South Dakota National Guard, has been selected as drill master for the Hutchinson Home Guard.

THE NEW HAVEN GAS LIGHT COMPANY is co-operating with the Food Administration by placing the company's assembly room, 70 Crown Street, New Haven, Conn., at the disposal of Miss Mathilde Hawkins, who is carrying on food conservation demonstrations. Miss Hawkins, at the meeting held March 20, had as her topic a problem of intense interest to women, "The Sea Foods Recommended by the Food Administration; How to Prepare Them, How to Lower Housekeeping Expense by Their Use, and How to Save Time in Cooking." This is not only co-operation in the saving of foods needed for our fighting forces overseas, but it is an actual benefit to housewives who are often puzzled to know what substitutes in foods to use on meatless and wheatless days. These demonstrations are held weekly at the gas office and are free.

DONALD MCDONALD, general manager of the Louisville Gas & Electric Company, Louisville, Ky., has offered two of the company's vacant plots of ground to citizens for war gardens.

DANIEL DWYER, a former employee of the Peoples Gas Light Company, Manchester, N. H., who left March 29 for Camp Devens, having been drafted, was presented with a complete kit by his friends in the gas company. The presentation was made by William Kennedy. Mr. Dwyer expressed heartfelt thanks for the kit and said it would constantly remind him of his friends in Manchester. Previous to being accepted for the draft army, he had twice tried to enter the navy, but had failed to pass the physical examination.

HOMER J. KUNZ, industrial heating expert of the Toledo Railways & Light Company, Toledo, Ohio, has become manager of the mechanical research division of the war gas investigation, Bureau of Mines, at Washington. He is enrolled in developing deadly gases, liquid fire and other similar weapons in order to give the Hun a taste of his own medicine.

H. M. BYLLESBY & COMPANY recently announced that advertising space in several hundred newspapers throughout the country will be donated by Byllesby utility properties to advertising the Third Liberty Loan. Each manager will co-operate with the local Liberty Loan committee in the most effective manner.

LINCOLN BEERBOWER, manager of the Oklahoma Gas & Electric Company, Enid, Okla., division, as a member of the Rotary Club, has been given charge of a district to supervise the sale of Liberty Bonds during the present campaign.

The Spirit of Public Service

As early as Sunday, Dec. 30, 1917, serious consideration was given to the proposition to discontinue the sale of all heating devices, in view of the demand for gas. With full realization that the continuance of the sale of heating appliances meant still greater demand for gas supply, it is unanimously decided in this time of great stress that the gas companies should not fail the public in its extremity, where hundreds of lives might be sacrificed, and no restriction, other than the sale of but one gas heater to each purchaser, was placed upon the sales departments. At that time gas companies throughout the country had absolutely shut down on the sale of heating appliances.

Never before has the manufacturing and distributing cost of gas in this city been as high as at the present time, except, perhaps, when gas was first introduced, and the price charged was $10 a thousand cubic feet, and a rental charge was made for gas fixtures and the meters.

There are thousands of consumers of gas whose bills amount to 30 and 40 cents a month, and there are many thousands of consumers whose bills amount to less than 5 cents a day, and in both cases equally excellent service is rendered.—*Robert E. Livingston in the New York Post.*

Rate Increases Reflected in Improved Public Utility Earnings

The Chicago *Tribune* of March 17 contained the following paragraphs in an article entitled "Public Utility Situation Now Looks Brighter":

"The public utility situation is gradually turning for the better. A compilation of the annual reports of ninety-three of the principal corporations for the year ended Dec. 31 shows aggregate net earnings of $207,761,420, as compared to $192,761,420 in the previous year.

"The improvement in the average and the aggregate is largely due to the fact that State and municipal boards having the power of rate regulation have adopted a new policy toward the utilities and recognizes the fact that the welfare of the nation at war depends in a large measure on the good credit and operating efficiency of public utilities."

Necessary to Deal with Domestic Heating as a Major Branch of Commercial Department Activities if Maximum Sales are to be Expected

No Need to Exaggerate Merits of Gas Heating to Obtain Orders; Its true Merits are in Themselves Sufficient to Sell It—Set Backs Gas for Domestic Heating Has Sustained in the Past

By W. H. SCHOFIELD
President Sanitary Heating Company, Brooklyn, N. Y.

Each year the subject of use of gas fuel for supplying auxiliary or principal heat in the home is receiving more serious consideration by gas companies and the public.

In order to increase and maintain this public interest the question must be dealt with and placed on a much higher plane of importance than has been the practice in the past.

Importance of Heating Branch

Heating appliances should not be treated or handled as temporary makeshifts, but as substantial, permanent and dependable equipment for the home for more and better reasons than you would advocate a standard range or "cooker" instead of a "hot plate" in the kitchen of the home owner.

A gas heater is usually installed in the most conspicuous part of the home, and should therefore become an important appointment of the home. The owner may be persuaded to purchase a temporary makeshift—a device to be connected with a rubber tube and ignited with a match, and even though he may not be aware of the element of danger, he soon becomes impressed with the lack of efficiency and appearance, and welcomes the time for its removal.

Some months ago the commercial department of one of our prominent gas companies received considerable publicity as a result of a house-heating campaign that reported sales of several thousand gas heaters. This result was obtained by picking up inexperienced salesmen and sending each one out with a sample heater with a flexible tube so that a practical demonstration could be made in the home. This campaign resulted in large sales of cheap heaters of insufficient capacity, the effects of which the company will not recover from for some time to come, and represented a lot of time and money spent with good intent, but only to demonstrate seemingly the inefficiency of gas heating. One thousand good heaters intelligently sold and installed would have not only made thousands of friends for the "gas way," but would have greatly increased public interest, and in this past winter proved to be a good remedy for coal shortages.

Heaters Should Do Work Required of Them

Gas companies should sell heaters that will do the work that is required of them in the home. Heaters must have established reputations for performance and efficiency, and gas men must not become intoxicated with sentimental ideas and technical discourses. Remember that the success of any heater that can be used in building up the gas-heating business must be one that has made good in the home.

Do not "put all your eggs in one basket." Select three or four good types of heaters—the same as you do in ranges—and sell the heaters that best cover the requirements from the standpoint of their adaptability to the fireplace openings and heat requirements, the same as is done in the sale of gas ranges.

Every gas company usually carries four or five makes of ranges, and rarely ever a cheap one, but you must bear in mind there is a greater variety of heating appliances than there is in cooking appliances. Consider the thousands of fireplace openings in the field that are not equipped with any kind of heater, and that are generally found in the class of better built houses which are already equipped with inefficient heating facilities, and additional heat would be greatly appreciated, and

95 per cent of these openings can be fitted with a good gas heater.

Suggestions for Sale of Heating Appliances

1. Those in charge of the sale of appliances should get the fact well grounded in their minds that there is more gas being used for heating purposes than ever before, and that possibilities for expansion are unlimited. You can only sell one gas range to one family. You may possibly sell two or three heating appliances.

2. That the sale of gas-heating appliances is not limited to a few months, but can be sold for domestic use of six months, and during other months to builders.

3. That publicity is just as important in the sale of gas-heating appliances as it is in other devices. A demonstrating display and a showroom "set up" with all its working and home environments are important, and a means to developing sales and leads. If you maintain a department to teach domestic science as applied to the gas range, let this be extended to practical talks on the gas-heating problem in the home. This should be augmented by mailing cards, "follow-ups" and local advertising.

4. Soliciting and selling. Can it be done as successfully by the representative of the gas company as by the salesman of the manufacturer? The representative of the gas company has the advantage of better means of entree into the home, and he can develop the same standard of selling efficiency, if he is properly schooled in the special features and "talking points" as he is in the selling of ranges, lamps, etc. Each agent or branch usually has from one to five outside men whose duty it is to get a line on existing and possible equipment that may be required in the home he visits and report same to his superior.

Specializing

Specializing in sale of heating appliances is always successful; in fact, the men who specialize in the sale of any kind of gas appliances make the biggest sales and get the largest pay. The reason is that the man who specializes knows what he is talking about. He inspires confidence through his knowledge.

Why gas companies do not make more sales of gas-heating appliances is due to the fact that the salesman handles the sale of gas heaters as a "side line." He is schooled and equipped to talk lights, ranges and irons. He therefore likes to talk things that he is best prepared to discuss. He might be in a home where the only chance of making a sale is a heating appliance, but he has exhausted his efforts on other appliances, and is unfit to retain the interest of a possible prospective purchaser. A plan that has proved successful is to have the general salesman not attempt to talk gas heaters, but state to the customer that he "will have our Mr. —— call and give full information." "He is one of our heating experts and will tell you all about it."

It sounds good to the customer and greatly increases the chance of a sale, and the commission points or profits arising therefrom can be divided between the general salesman and "the heating expert." In the sale of heating appliances to builders expert knowledge on heating is indispensable.

A high official of one of our large gas companies stated to the writer about a year ago that "our fellows are likely to wake up some day on this heating game and its importance, and do you know I would not be surprised if they wait until the electric heater comes along. They seem to sleep at the switch when the field is all theirs, but let the electric people bring out a new iron or lamp and they get busy."

Misleading Statements to Promote the Sale of Gas-Heating Should Be Discouraged and Avoided

The public naturally looks to the manufacturers and sellers of gas appliances for reliable information concerning the merits of the devices they make and sell, and if the device has recognized merits and it has enough good talking points there should be no necessity for resorting to extraordinary statements to secure business.

In gas-heating appliances that involve the basic principles of combustion, radiation, circulation and ventilation, and their influence on the atmosphere and temperature of the space to be heated, probably the question that is most often asked is in regard to the consumption of the oxygen—"Does it burn the air?" or "Does it consume the oxygen in the air?"

There is only one answer to make, and that should be carefully stated, as a great many people have the opinion that gas fuel exhausts the oxygen in promoting combustion. Say, Yes, all gas-heating appliances, like heating appliances that use other kinds of fuel, do consume a certain amount of the oxygen in the air, but that heating devices that do not consume over 30 ft. of gas per hour will not vitiate the air to an extent that would cause complaint. The difficulty in dealing with this problem is due to the fact that the public have been misled by makers and sellers of inferior appliances that laden the air with offensive products of combustion, and the explanation is that "all gas heaters consume the oxygen in the air, which causes the heavy feeling and disagreeable odors." This has by many become an accepted theory, and has proved to be very detrimental to the pioneers of gas heating.

Cure-alls to Prevent Atmosphere Vitiation

In suggesting a remedy for overcoming the vitiated air (which is only ordinary air contaminated with poisonous products of combustion), the same misleading statements are resorted to, and the confiding public is told that a small quantity of water placed in a vessel in or under the device will supply the lacking oxygen and create a healthy atmosphere. It is on a par with the statements made by makers of certain types of appliances that require venting into the flue—that "all of the offensive products go up the flue and the good products go out into the room."

As previously stated, it is not necessary to practice deception in order to sell a good device, and by doing so it shakes public confidence and creates unfavorable reaction and prejudice in the public mind and retards progress in extending the use of gas heaters.

My attention has been called to a recent publication in one of our gas journals of an address delivered at a gas convention by a representative of a concern that manufactures a very good radiating type of gas heater, in which it is stated that the radiation from his heater "would not affect an ordinary thermometer, because the glass bulb on the thermometer reflected the heat away." He

also stated that the radiation would "go through a cake of ice"; that "it passes through the air without appreciably warming it." My informant, who attended the convention, remarked, "I don't think that man ever saw old Sol's radiation pushing up the thermometer on the World Building last summer. I saw it register 120 deg. when the radiation struck it fair in the afternoon, and am sure there was some warm air around that corner, and as ice is about as good a reflector as glass, 'I shall continue to be from Missouri' on the ice proposition." There may be good reasons for making such statements, but it must be admitted that while the attending members were compelled to hear it, very few of them probably accepted it. Why not make concrete statements in claims for superiority.

In presenting the important features of the devices manufactured by the company I represent, we discuss each feature separately, i. e., the substantial construction of the device, perfection of combustion, *circulation*, convected and radiant heat as the important factors in heating space. We then propose to submit either the fireplace type (Solar Grand) or the portable type (Perfecto) for a practical test against any heater claiming to be in their class under the usual plan, i. e., each heater to be installed in the same room; test to cover increase of temperature in a given time from an equivalent gas consumption; temperature tests to be taken by three thermometers, one located in center of room and two on back walls.

About Installations

The question of the installation of gas-heating appliances is not understood, and the difficulties are overestimated. It is estimated by people who have made thousands of installations that 50 per cent of them are comparatively easy, 25 per cent comparatively difficult owing to the inaccessibility of gas openings, and 25 per cent should be classed as difficult owing to alterations required in fireplace openings. Four hundred and ninety-nine sales out of every 500 should be installed, and any gas company can prove this rule if they will go into the question thoroughly.

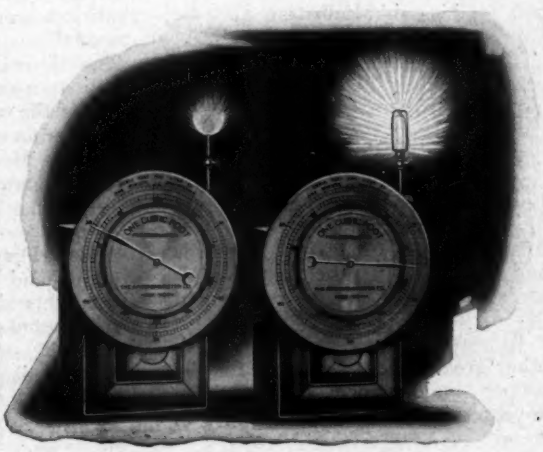
The great importance and possibilities of the use of gas fuel for heating the home was demonstrated in Greater New York during the present winter, which proved conclusively that gas heating can be made the most important branch of the gas industry.

Help Them to Visualize the Saving by Using Mantle Lights

The war is affecting everyone and every industry. The demand by the Government for toluol will necessarily result in the gas companies manufacturing and sending out a leaner gas. This will be beneficial to the gas company as well as to the consumer. The rich gas which is now being generally manufactured causes all kinds of trouble not only to the gas company by clogging up the mains, meters and house pipes, and in many instances causing the gas supply to be insufficient, but also to the consumer by causing the open-flame burners to smoke, the mantle of incandescent lights to become carbonized, rendering it difficult to economically operate gas apparatus used for domestic and commercial purposes.

When the gas companies begin to send out leaner gas, the consumers will at first be somewhat annoyed by the necessity of changing the regulation of the gas burners to meet the new conditions, but after the regulations are once made the gas service will be satisfactory.

Gas burners equipped with incandescent mantles give a very much more radiant light than do the flat-flame burners, and are many times more economical in their operation, and it would seem as if it would be to the advantage of gas companies to so demonstrate to their customers by means of a simple device. This can be easily done at a small cost by having two meters with large dials, one equipped with a flat-flame burner, operating along side one another in a conspicuous place — either in the gas display room or in the window of the gas display room. The difference in the movement of the indicating hand is so great as to be at once noticeable. A similar method was for many years used by merchants selling gas appliances, but this custom, we think, was not followed by the gas companies on account of the high cost of the meters which were used for this purpose, these being known as "burner test meters," which are very expensive to manufacture and keep in repair.



The meters illustrated in the cut below are of the ordinary house type, simply equipped with large dials so that the difference in consumption can be readily noted.

The installation of the above equipment could be very advantageously used in gas appliance display rooms.

Making Our Home Expenses Fit Our War Needs

In a Rockland, Mass., newspaper recently there appeared the following announcement, which is indicative that the Old Colony Gas Company is a live wire:

"On every hand we see manufacturers and merchants readjusting their business to meet emergencies which have arisen out of war policies.

"The manufacturer before the war was able to buy his material in large quantities and take advantage of a low cost. Since the war began all manufacturers buy their raw material wherever they can. It is not a question of cost with them, but delivery, and this material is bought at prices far beyond their legitimate purchase price. Salaries of employees are increased as never dreamed of by either the manufacturer or workman. Because of this condition in the manufacturing world merchants must sell every commodity of life for higher prices than sold for before the war.

Now we are taking advantage of this new condition in our homes, we

are putting the home on the same efficient basis that the business world is putting business. Are we looking forward and making preparations for the coming year and its possible needs and comforts of the home?

"We say 'yes' we are saving wheat, observing meatless and other patriotic days as prescribed from time to time by the various administrators of public welfare.

"How about fuel? We cannot easily observe heatless days when the thermometer is below zero, and yet there is great possibility that coal will be even harder to obtain next winter than it was this winter.

"From Government reports we learn that 630,000,000 tons of coal were mined and used last year, and that the amount obtainable in 1918 will not exceed this amount. If so, somebody will have to go without.

"Why not save individual allotments during the next eight or nine months and use fuel for cooking and heating; that will be cheaper and cleaner, saving waste and dirt?

"Gas is best by every test for cooking, lighting and heating.

"Appliances can be bought and installed on easy payment plans.

"Call the Old Colony Gas Company and have one of their domestic experts tell you how to use gas and help the Government win this war for liberty. Do it to-day."

Consolidated Gas Company Increases Stove Rental Rates

The Consolidated Gas Company, of New York, will increase the rental rates of all gas ranges on April 1. The additional charge will vary from 50 cents to $2 a year, according to the type of range. Notices have been sent to the heads of more than 431,000 families in Manhattan and the Bronx announcing the new scale.

The following announcement appeared recently in one of the New York newspapers:

THE RENTAL SYSTEM

For gas ranges has been the means of saving many millions of dollars for Manhattan and Bronx landlords and tenants. In other cities landlords or tenants buy the ranges and pay for repairs, etc.

Increased taxes, together with other greatly increased costs for the proper maintenance of buildings, have resulted in a heavy advance in rentals. Landlords would have had to make a larger increase had they been compelled to invest capital in gas ranges, pay for their installation and the necessary repairs, or replace ranges made unfit for use through careless and improper treatment.

THOSE ARE THE BURDENS WE CARRY

under our "rental system," under which we lost $200,000 in 1916, and large amounts in other years.

We rent ranges of the highest standard for $3, $5, $7 and $8 a year. In other words, we rent you a small range for less than 1 cent a day and a large range for a trifle more than 2 cents a day. Due to the increase in the cost of materials and labor, the manufacturers since 1916 have increased the prices of those ranges to us 128, 100, 116 and 95 per cent, even though our purchases are in large quantities. In addition to the higher costs for repairing etc., which we now have to meet, we furnish a "service" pronounced by the United States Government to be the best in the country.

Haverhill Gas Company Reaps Benefit, While Electric Company Loses

While less electricity was consumed during the period in which the early closing rules of Fuel Administrator James J. Storrow were in force, the decrease in the amount of coal burned at the Haverhill Electric Company's plant does not compare, as the quality of the coal was so poor that more tons were burned to produce the amount of current used than were burned a year ago when conditions were normal and the fuel was of the usual quality.

The decrease in the amount of electricity used is reflected in the receipts of the company, which show a shrinkage over those of last year. While the Monday holidays were in force, the amount of electricity consumed by the factories was cut down by a little more than a sixth. The rule forbidding the lighting of store windows and the cutting out of the street lights also caused a shrinkage in the amount of current used and the size of the storekeepers' bills. The closing of dance halls at 11 and the theaters and club and lodge rooms at 10 also cut down the electric company's load, not to say anything of the attempts made by the individual householders to keep their bills down by cutting out all unnecessary lights.

While the electric company was hit hard by the closing rules the Haverhill (Mass.) Gas Light Company reports an increase in receipts, due to additional amount of gas used for heating the rooms and homes of persons unable to get coal or wood. If the amount of gas used for lighting purposes could be figured separate from that used for heating the amount used for lighting might show a falling off, but the extra amount used for heat offsets such a shrinkage and sends the total amount of gas manufactured and consumed to new records.

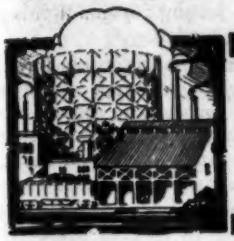
Indianapolis Company Will Merchandise Low Consumption Heaters to Reduce Demand

In a letter written to the General Gas Light Company, Kalamazoo, Mich., the Citizens Gas Company, of Indianapolis, stated that on account of the shortage of gas in Indianapolis, Ind., during the past winter, they had not sold heating appliances of any character except in special cases. With the coming warmer weather they have decided to advertise the "Radiantfire," and offer a credit for old-style grates, logs, etc., which are replaced.

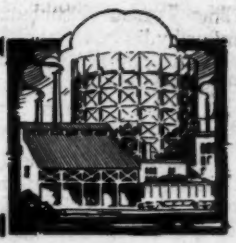
It is not their intention to push the sale of any heating appliance which will mean an additional consumption, and their main object is to offer to customers an economical appliance to replace the more extravagant ones in order to conserve the supply of gas for next winter.

Increase Asked by Coast Gas Company

Formal notice of the Coast Gas Company's application for an increase in gas rates was served on the Bradley, N. J., commissioners recently. The notice set forth at length the reasons for the application. Either a fixed meter charge, the lowest of which will be 50 cents a month, or a flat increase of 25 cents a thousand feet of gas consumed, are the alternative demands of the company.



NEWS OF THE GAS INDUSTRY



Danger of Department Stores and Dealers Usurping Gas Companies' Appliance Business Given Considerable Attention at Joint Meeting of Pennsylvania and New Jersey Associations

Gas Companies Will Require 750,000 Tons More Coal This Winter than During the Past—More Efficient Appliances to Keep Down Outputs—William R. Rhoades Elected President of Pennsylvania Association—Ormsby F. Potter Heads New Jersey Association

The 1918 meeting of the Pennsylvania Gas Association was held on the Roof Garden of the Adelphia Hotel, Philadelphia, April 10.

The members were addressed by Dr. E. J. Cattell, statistician of the city of Philadelphia. Dr. Cattell's welcome was replied to by William R. Rhoades, of the Williamsport Gas Company.

The association elected twelve new members, making a total of active and associate members of 155.

After routine reports by the secretary and treasurer, the following new officers for the ensuing year were elected: President, William R. Rhoades, Williamsport, Pa.; first vice-president, George S. Speaker, Lebanon; second vice-president, Oscar L. Heckert, York, Pa.; secretary and treasurer, Louis R. Dutton, Jenkintown. Council for one year, W. A. Allison, Philadelphia; council for three years, E. L. Smith, Towanda; Stanley Grady, Philadelphia; George W. Beck, Sunbury. The various officers reports and committee reports followed.

J. B. Klumpp stated that a meeting was to be called in the first week in June, at which the amalgamation of the National Commercial Gas Association and the American Gas Institute would be concluded.

Fixed rates of dues for active and associate members with the new association, which would be called the American Gas Association, would be taken up, and that it was expected that the association would probably have $150,000 a year to spend for the promotion of the gas industry.

The next annual meeting will be held at Williamsport, Pa. The meeting adjourned at noon to be reconvened at 2 o'clock as a joint meeting with the New Jersey Gas Association.

The afternoon session opened with the address of Mr. Joyce, of the Public Service Commission of the State of Pennsylvania. Mr. Joyce outlined plans the commission was working on for the adoption of a classification and of uniform accounts, and said that they expected to soon have ready to print a discussion in tentative form to submit to the gas companies for their criticism.

William A. Rhoades stated that the companies were now giving a great deal of attention to this matter, a committee having been working on same since last spring along the lines suggested by Mr. Joyce

The Coal Demand

H. H. Ganser, L. R. Dutton and J. H. Keppelman made brief remarks on the subject, and it was moved that the committee be appointed to meet with the public service commission at some future date to get full data as to just what the commission requires, and that the committee have full authority to act for the association.

William H. Gartley, Philadelphia, Pa., vice-chairman of the gas and electric committee, gave a brief outline of its work. He suggested that the greatest care be used in filling out questionaires submitted by the Government, through the different departments, and to give all the data asked for and do so promptly. He considers that the supplies for gas companies will not be any better this coming winter than during the past winter, and hinted that it might be necessary to do as they are in England and France—limit the amount of gas which any one consumer could use in a given time. He stated that the Fuel Administration had advised the gas men to resist strongly the use by the railroads of the best gas coal. The gas companies will require about 750,000 tons more the coming winter than during the past, and therefore the gas companies should insist upon having a share of the best grades of coal. Mr. Gartley urged very strongly that the companies should act entirely in their dealings with the departments at Washington through the gas and electric committee, and to give it their heartiest cooperation.

H. H. Newman, of Trenton, read a paper prepared by O. F. Potter on

"The Present Problems in the Gas Industry."

Preserving the Appliance Business

J. M. Brock, of the Eclipse Stove Company, stated that the companies must take immediate action to preserve their commercial business, for the reason that manufacturers of appliances have been approached by department stores, dealers, plumbers, etc., and that it is up to the gas companies to retain this business.

F. N. Hamerstrom pointed out the fact of the large earning power of the working people to-day, and that light was a necessity, and the gas companies could now increase their business by a large percentage, and without long-time payments, through the installation of lighting fixtures. The electric companies were not in a position to spread out at this time, and this gives the gas man his opportunity if he will take advantage of it promptly.

J. P. Hanlan, of the Public Service Gas Company of New Jersey, suggested that the public be educated to use gas more efficiently, by supplying them with the best apparatus on the market to accomplish the results desired, which can now be accomplished with much less consumption of gas than with the old style apparatus.

Mr. Ganser also pointed out the dangers of the department stores, dealers, etc., undermining the gas company's appliance business, which later it might be hard to get back, if it was allowed to get away from them now.

The banquet was held at the Adelphia in the evening, the principal speakers being Walton Clark and Captain Dressel. C. E. Bartlett was chairman of the entertainment committee.

New Jersey Gas Association

The new officers of the New Jersey Gas Association are: President, Ormsby F. Potter, Newark, N. J.; vice-president, J. M. Brock, Flushing, N. Y.; secretary and treasurer, B. K. Johnson, Gloucester, N. J.; directors, Duncan Worrell, Philadelphia; Charles W. Hoy, Glassboro, N. J.; Stanley Grady, Philadelphia. S. J. Franklin, of Millville, N. J., was elected as affiliation representative to the American Gas Institute.

Mr. Potter, in his address, thanked the association for re-election, and stated that the Public Service Gas Company has been practically forced to eliminate its new business departments on account of the difficulty of supplying gas for present demands.

In a discussion as to whether the gas companies should push gas lighting and heating apparatus under the present conditions, J. P. Conroy, of New York, stated he felt that it should render the best service possible, and in order to do this should furnish the best fixtures possible, so that customers could effect economies in lighting cost.

Conditions That Must Be Overcome

S. J. Franklin stated companies had been forced to increase output from 10 to 18 per cent in the past year; that some companies had been granted increases in rates, while others were selling at a loss.

Jacob B. Jones, of Bridgeton, N. J., said two conditions must be overcome: the supply of basic material for gas-making and the adjustment of old rates. He said that now was the time to push good gas lighting, but better rates must be obtained generally.

F. N. Hamerstrom, Gloucester, said that not one single argument had been advanced as to why gas companies should not push gas lighting. Gas lighting is on the threshold of gas economy. The Government needs toluol, and that need takes the candle-power requirements out of its gas standard. The commission will abide by the wishes of the Government for a lower candle-power standard. The gas lighting business can be saved by installing modern gas lighting appliances. Clean up dead services with good gas lighting, and electricity for lighting purposes will be replaced. Of all the gas consumed 30 per cent is used for light.

In New York City 1,000,000 flat-flame burners are used to give all the light produced in the houses where they are installed. Replace these with modern fixtures and an immense quantity of coal will be saved. If gas companies had turned their new business men to selling light they would not have had to discharge them. Then bear in mind, the day that is to come when the war will be over, if gas lighting business is neglected now, electricity will replace it then. The gas man can do much to create a good feeling for gas lighting now, and it is needed.

H. H. Newman, of Trenton, N. J., wanted to know whether any gas companies had made any money out of merchandising. He said that there is a chance to sell appliances, but the gas man should proceed carefully.

Companies Will Save Nothing By Discontinuing Merchandising

Charles W. Hoy, Glassboro, N. J., stated that his company had gone before the commission with open books and had been granted an increase. Companies going before the commission should present full facts as to the constantly increasing costs to the gas company. The commission cannot know these figures, and has to base its decision on data laid before it. He declared that the gas companies will save nothing by discontinuing the sale of fixtures.

R. H. Garrison, of Atlantic Highlands, N. J., stated that his company had made money selling appliances, and proposed to make more selling in the same way.

York County Gas Company in Receivers' Hands

The York County Gas Company, whose plant is located between Dallastown and Red Lion, Pa., went into receivership. George C. Althouse and Harry Stille were appointed temporary receivers by Judge Wanner, with power to collect outstanding claims due the company and to operate the plant, provided they can do so out of receipts from operation or by contributions of money from bondholders or other interested persons. The receivers are also directed to sell the company's property with a view to a distribution of assets among creditors and to accomplish this purpose the receivership decree contains a clause restraining all creditors from suing or issuing executions on their claims.

The company contends that, owing to pending court proceedings whereby its title to the property taken over from its predecessor concern, the Suburban Gas & Fuel Company, has not yet been confirmed, it cannot raise funds to put the plant on a working basis. As a consequence, it shut down furnishing gas on Feb. 4.

Minneapolis Gas Ordinance is Put Off 30 Days

The city council will permit the Minneapolis (Minn.) Gas Light Company to operate for thirty days under its new contract with the Government for making toluol, before framing an ordinance to cover the candle-power situation.

At a meeting of the council public lighting committee March 22 the contract was read. The Government agrees to recompense the gas company for any rebates it may have to pay due to taking the toluol from the gas.

R. R. Rand, president of the company, said that while the Government experts estimated the candle-power would be reduced from the 15 candles required by the city ordinance to 10 candles, it would take thirty days to determine just what would happen to the candle-power.

Rate Increase Granted Canton Company

The State public utilities commission recently entered an order making effective as of March 1, 1918, rates for gas furnished by the Canton (Ill.) Gas & Electric Company as follows: $1.20 per 1,000 cu. ft. gross, $1.10 net.

The minimum bill is fixed at 50 cents.

A rate of $1.20 was fixed for prepayment needs.

The order is effective until March 1, 1919, when the commission will either extend or discontinue it.

Elizabethtown Company Seeks Rate Increase

Interesting developments in a gas rate hearing at Newark, N. J., recently were that the Elizabethtown Gas Light Company, which has applied for an increase of 10 cents per 1,000 cu. ft. in its price, has been supplying gas to Perth Amboy at 50 cents per 1,000 cu. ft., while the cost of manufacturing and distributing is between 52 and 53 cents; also that the gas company has been paying dividends of 40, 35 and 30 per cent on the stock of its Elizabeth plant, 4 per cent on the Rahway plant.

The Elizabethtown company controls the Perth Amboy, Rahway, Cranford and Metuchen plants. According to Francis Engel, secretary of the Elizabethtown corporation, it costs about 35 cents per 1,000 ft. to manufacture gas for delivery in the Elizabeth district, and 45 cents per 1,000 for delivery in the Rahway and Cranford districts.

Financial Burdens Cause of Poor Service at Niagara Falls

The Niagara Falls (N. Y.) Gas & Electric Light Company, in its answer filed recently with the up-State public service commission to the complaints made of inefficient service, admits the truth of the allegations, but gives as the reason for such service financial burdens.

The company asserts that its plant is working to its capacity daily in an effort to get sufficient gas for the consumers. It admits that the gas at times is impure and that the pressure is low. If the company can get financial assistance it will put in an additional gas plant and will lay about 25 miles of new gas mains, as well as moving to a less congested portion of the city.

The answer also sets forth that during the unprecedented winter the company had to commandeer such coal as it could, and then too many persons who ordinarily use coal for cooking turned to gas and this made the drain on the supply most unusual.

Petition Filed for Discontinuance of Service in Palestine by Oblong Company

The Oblong Gas Company of Illinois has filed a petition with the State public utilities commission for permission to discontinue service in the village of Palestine, Ill., and to remove its pipes and mains from the streets of that village. The gas company's request is being contested by that community.

New Rates in Effect at Yakima, Wash.

In a former order entered recently the State public service commission authorizes an increase in the gas rates of the city of Yakima, to be charged by the Pacific Power & Light Company, effective March 1. The old 50 cents a month minimum is abolished and a straight schedule of charges is to be installed.

In the following rates a 10-cent discount is allowed if bills are paid within ten days, making the net rate 10 cents lower than the rate quoted: First 100 ft., 75 cents, discount 10 cents, net 65 cents; 200, 85 cents; 300, 95 cents; 400, $1.05; 500, $1.20; 600, $1.30; 700, $1.40; 800, $1.50; 1,000, $1.70; second 1,000, $1.65; third, $1.60; fourth, $1.55; fifth, $1.50; sixth, $1.40; over 10,000, 90 cents.

Prepay meters also get the 10-cent discount. These run the same as the others up to 400 ft., and all over 400 is at the rate of $1.65, which, with the 10-cent rebate, means $1.55. The increase, it is announced, will bring the company about $14,000 a year.

Boston Output Increased

March output of the Boston Consolidated Gas Company totaled 572,494,000 cu. ft., an increase of 9.9 per cent.

Protest Against New York Municipal Ownership Legislation

Directors of the New York Merchants' Association have entered a vigorous protest against the passage of bills now pending in the New York Legislature authorizing municipal ownership and operation of public utilities.

Higher Rate Sought for Three Rivers, Mich.

The Three Rivers (Mich.) Gas & Electric Company, through Manager Paul B. Simons, presented to the city council a statement of the cost of operating the gas plant during the past year, the figures showing that gas was being sold at a price lower than cost of operating—not including interest and depreciation. The statement of costs was accompanied by a frank statement of the gas situation and an appeal to the council for relief from the situation.

The company submitted figures and a statement to prove their contention of loss during the past year amounting to over $3,500, and showing that the increased rate would not compensate fully for loss in interest and depreciation, but would aid in tiding over the present abnormal financial condition.

The schedule submitted by Mr. Simons asks for an increase of 45 cents for each block of the present

rate, making the proposed prices as follows:

$1.85 per 1,000 cu. ft. for the first 2,000 cu. ft. per month.
$1.65 per 1,000 cu. ft. for the next 2,000 cu. ft. per month.
$1.55 per 1,000 cu. ft. for the next 1,000 cu. ft. per month.
$1.45 per 1,000 cu. ft. for the next 5,000 cu. ft. per month.
$1.35 per 1,000 cu. ft. for the next 15,000 cu. ft. per month.
$1.25 per 1,000 cu. ft. for the next 25,000 cu. ft. per month.
$1.15 per 1,000 cu. ft. for the next 25,000 cu. ft. per month.
$1.05 per 1,000 cu. ft. for all over 75,000 cu. ft. per month.

The discounts are to remain the same—10 cents per thousand cubic feet on all bills paid within ten days of date of bill.

Personal Notes

THE CONSUMERS GAS COMPANY, Reading, Pa., held a meeting recently at which the following officers were re-elected: John H. Keppelman, president and manager; Walton Clark, vice-president; G. W. Curran, secretary. J. Morris was elected treasurer to succeed James Ball, who died recently. Directors: G. W. Curran, Lewis Lillie, Walton Clark, Richmond L. Jones and John H. Keppelman.

CORNELIUS A. MCCARTHY, who was connected with the Lawrence (Mass.) Gas Company for some time, was recently elected treasurer of the Arlington Trust Company and assumed the new duties March 25. While he has not as yet concluded his services with the gas company, arrangements have been made whereby it is possible for him to devote a portion of each day to the trust company.

GEORGE W. ALLEN, secretary and treasurer of the Canadian Gas Association, will deliver a lecture before the Women's Club, Home Economics Department, of Schenectady, N. Y., entitled "One Hundred Ways to Save Gas in the Home," on April 15. This lecture is under the auspices of the Mohawk Gas Company and the Schenectady Iluminating Company.

FRANK W. FRUEAUFF, vice-president of the H. L. Doherty Organization, celebrated his forty-fourth birthday on Friday evening, March 29, at Delmonico's, New York, as the guest of 125 friends, the majority being business associates. The birthday gift consisted of a rare and handsomely bound copy of "The Pilgrim's Progress," and extra flyleaves recorded the signatures of all those present. The dinner offered the opportunity for a verbal procession of tributes, and Henry L. Doherty led in lauding his partner's ability. "We take pride in the wonderful business ability and personal character of Mr. Frueauff," said Mr. Doherty in closing. "In Mr. Frueauff we have an executive with the right kind of stuff in him."

J. A. FRICK, vice-president and general manager of the Allentown-Bethlehem Gas Company, Allentown, Pa., read a very interesting illuminating paper before the Rotary Club at its Monday luncheon at the Hotel Allen, March 23.

C. M. BREWER, manager of the Richmond, Cal., Division of the Western States Gas & Electric Company, has been re-elected director of the Richmond Chamber of Commerce.

J. W. STIRZEL, who was connected with the United Gas Improvement Company, Philadelphia Gas Works, Philadelphia, Pa., died recently. He was a member of the Philadelphia Section of the Illuminating Engineering Society.

H. A. STOCKTON, formerly connected with the American Gas Syndicate, of Chester, Pa., and the United Gas Improvement Company, of Philadelphia, has been placed in charge of the Standard Gas Company's interests in Monmouth County. Mr. Stockton, who has had a wide and varied experience in the gas industry, will make his headquarters in Keyport, N. J., as superintendent of distribution.

C. J. DEMERS, who formerly had charge of the various departments of the Standard Gas Company's interests in Keyport, N. J., will assume the management of the commercial interests throughout the gas company's territory. He will probably locate in Freehold.

C. PURNELL LUKENS, who has been in charge of the new business department of the Bangor (Me.) Gas Light Company since October, 1916, and who has been very successful in that work, has just accepted a position with the Chuctanunda Gas Light Company in Amsterdam, N. Y., of which O. A. Merchant, formerly manager of the Bangor company, is general manager. Mr. Lukens has been prominent in Chamber of Commerce affairs, having taken part in the recent campaign, in which he accomplished much. He began his business career with the Jenkintown & Cheltenham Gas Company at Wyncote, Pa., later becoming superintendent of the new business department of the Philadelphia Suburban Gas & Electric Company in Jenkintown.

THE WESTERN UNITED GAS & ELECTRIC COMPANY, Aurora, Ill., held a meeting recently at which the following officers were elected: I. C. Copley, president; C. B. Strohn, vice-president; Fred Bennett, secretary; Helen O'Meara, first assistant treasurer; C. B. Strohn, second assistant treasurer. Mr. Strohn succeeds his brother, R. N. Strohn, who resigned as director and vice-president when he went to England for the Red Cross several months ago.

J. H. GALT, who has been in charge of the Brunswick Avenue Works of the Public Service Gas Company, Trenton, N. J., has been made assistant engineer of distribution in the Southern Division, Camden, N. J.

WILLIAM M. BLINKS, former gas man, died at his home, 123 East Eighth Street, Michigan City, Ind. He was born in Tenterden, England, Nov. 15, 1833. In 1882 he acquired an interest in the gas plant in Michigan City, forming a partnership with Michael Romel, now deceased. After leaving the car company, he gave his entire attention to the development of the gas business until 1897. The firm became known as the Michigan City Gas Company, organized in 1882, and Mr. Blinks was chosen the president. He remained in that position for fifteen years, on the expiration of which period he sold out to a syndicate in Portland, Me. Since that time he practically lived retired from further business cares.

ALFRED J. DIESCHER, vice-president of the Empire Gas & Fuel Company, has transferred his headquarters from Bartlesville to New York, because of the increasing necessity of his presence at 60 Wall Street for consultation as to oil and natural gas affairs. H. R. Straight, R. C. Russum and W. A. Williams, of the Empire Gas & Fuel Company, comprise a committee that will handle affairs in the mid-continent field.

E. G. HOLZER, superintendent of the Easton (Pa.) Gas Works, will sever his connections with the company. He has been with the company since 1900, and in 1902 connected Easton with Phillipsburg, N. J. The water gas plant now in operation was erected in 1903 under Mr. Holzer's supervision. R. L. Peterman, superintendent of the electric department, will take charge of the gas department.

J. G. O'KEEFE, superintendent of the Market Street Works of the Public Service Gas Company, Newark, N. J., has been appointed superintendent of the Brunswick Avenue Works, Trenton, N. J.

ALLEN J. BRYAN, formerly assistant superintendent of the Brunswick Avenue Works of the Public Service Gas Company, has been appointed superintendent at the Consumers' Works, Jersey City.

RUDOLPH J. HEIN, manager of the Westfield (Mass.) Gas & Electric Light Works, resigned. His resignation takes effect May 1. The gas and light commissioners have no one in view for the position as yet.

Societies and Associations

New President of Wisconsin Association in Gas Industry Since 1899

John St. John, whose election as president of the Wisconsin Gas Association was noted in last week's issue, is vice-president and manager of the Madison Gas & Electric Company, of Madison, Wis. He received his schooling at Milwaukee and entered the employ of the Milwaukee Gas Light Company in 1899. During the following six years he was employed in various accounting departments of the company, finally working himself up to the position of general bookkeeper in 1905.

He was promoted from this position to the office of secretary and treasurer of the Muskegon Gas & Electric Company, of Muskegon, Mich., also an American Light & Traction Company property.

In this capacity he acted until 1908 when he again received promotion in the shape of a call to the office of secretary and treasurer of the Madison Gas & Electric Company. Last year Mr. St. John was elected vice-president and manager of the latter company, in which capacity he is acting at present.

He is a member of practically every leading gas and electric association in the country, and is well known in the gas fraternity.

THE ILLUMINATING ENGINEERING SOCIETY held a council meeting Feb. 14, at which the committee on time and place for the annual convention made a tentative report. The members of this committee, on which are representatives of each section, reached the decision that the usual annual convention, including the entertainment features and excursions, was undesirable at this time. The consensus of opinion seemed to be in favor of a short technical session. These actions were arrived at through correspondence. Council approved the report, and decided that a one-day technical session, consisting of papers on lighting subjects pertaining to the war, should be held. Details as to time and place were left in the hands of the committee.

THE INDIANA GAS ASSOCIATION will hold its annual convention at the Claypool Hotel, Indianapolis, on Wednesday, April 24, 1918, with a one day's session instead of a two days' session as heretofore. The proceedings of the association will relate entirely to the gas industries as effected by the war. The proceedings will not be published this year, but a stenographic report will be made and published in next year's proceedings. The meeting will be largely informal, and no advance copies of the papers will be sent to members. The program as arranged is as follows: "War Conditions Effecting Gas Industries," by J. B. Forrest, of Indianapolis; "Heat Value and Composition of Commercial Gases," by J. H. Maxon, of Muncie; "War Economics Relating to Gas Manufacture," by J. A. Patten, of Elkhart; "Cracking Oil in Coal Gas Bench and Removing Light Oil from the Gas—Worked Out as War Emergency," by C. D. Shaul, of Terre Haute. It is hoped there will be a large attendance and that all will come prepared and ready to take part in the proceedings of the convention.

THE GAS COMPANY EMPLOYEES' ASSOCIATION of the Pittsfield (Mass.) Coal Gas Company held the monthly meeting April 4. The members enjoyed a treat when Capt. I. S. F. Dodd, of the Medical Reserve Corps, told of his experience in the service. The talk was of real value to all who had the good fortune to be present. The realism and enormity of the task this country is engaged in were vividly described. There is no dodging the matter the speaker said; it is either a case of living under the "efficient" monarchy of German militarism or the free democracy for which our Revolutionary and Civil wars were fought. To attain the goal we have set out for a wonderful military machine has been constructed in a comparatively short time. Its successful operation depends primarily upon obedience. Money is of small importance comparatively; it is brains and skill that are looked to for success. Henry Ward, of the Navy, a member of the association who enlisted last August, was at this meeting. Thus both arms of the service were represented. A rousing reception was tendered both Captain Dodd and Mr. Ward. Ice cream, cakes and cigars were served by the refreshment committee at the conclusion of the meeting.

Construction Notes

Miami Plant Being Enlarged Four Times Its Present Size

In order to meet the increasing demand, the Miami (Fla.) Gas Company is spending $80,000 in making the plant one of the best in the United States and more than $40,000 in adding new street equipment such as mains and piping.

When the improvements now under way reach completion and the new equipment is completely installed, the plant will be enlarged to such an extent that its capacity will be more than four times its present size.

Where the old equipment could produce between 350,000 and 400,000 cu. ft. of gas in twenty-four hours the new equipment will manufacture approximately 1,000,000 cu. ft., while room is being provided in the new building for enough additional machinery to double even this increased capacity as the city grows and demands the extended improvements.

The new water gas set recently installed is an 8-ft.-6 machine. In addition to this new machine the old ones will also be used, supplemented by new improvements and appliances. The two old water gas sets are 4-ft.-6 and 5-ft.-6 machines.

All piping and connections throughout the plant will be 16 in. in diameter instead of 8 in. as before.

The new exhauster and washer and scrubber, two pieces of recently added machinery, have capacities of 3,000,000 cu. ft. a day, making that part of the equipment sufficiently large to supply the demand for many years to come.

New condensers have also been added to the plant, while larger purifiers, blowers and other machinery have been put in to coincide with the other new machinery.

The blowers, which keep up the pressure of gas in the mains, have been supplemented with two new ones, both larger than those which are now in use. One of these machines is run by steam and the other by electricity, making it possible to keep up the pressure throughout the night without keeping up steam.

A large steam elevator has been installed as a part of the new equipment, the purpose of which is to raise fuel to the second floor of the new concrete structure in order that it can be poured into the large furnaces.

One of the most important features of the new machinery is a water pressure system which will be controlled by forcible steam pumps in the main engine rooms as a fire protective measure. These pumps will keep a high pressure in the water pipes and in case of fire will be as serviceable as the fire department.

The new boilers, which are also now in use, develop over 150 hp. instead of 50 hp. that was developed by the old ones, and it is intended to install a larger boiler, which will develop 250 hp. as soon as it is needed.

When the old building is entirely emptied and the equipment now in it is put into the new structure, the old structure will be used as a fuel storeroom in which the coke and wood will be stacked.

J. W. Murdock, superintendent of the plant, stated that when the plant is completed it will consume 9 tons of coke, 5 cords of wood and 10,000 to 12,500 gal. of oil each day.

The improvements were started in July, 1917, and it is believed they will be completed by May 15, provided that no unforeseen obstacle arises in connection with the work. There is now a large force of men at work installing the machinery. All material with the exception of two carloads of brick for lining some of the large shells is now on hand.

New Gas House Contemplated for New Bedford

The New Bedford (Mass.) Gas & Edison Light Company has in view the construction of a new gas house.

Attica Buys Gas and Electric Plant

Thomas A. Sullivan, as president and attorney for the bondholders, announces the sale to the village of Attica, N. Y., of the properties of the Attica Gas & Electric Company March 30. The purchase was authorized by a vote in the village in favor of municipal ownership.

The village bought the plant, with gas wells, etc., paying $65,000 cash, and will spend approximately $40,000 in extensions and general improvements.

Contract Awarded for Addition to Factory of the Brown Instrument Company

A contract has been awarded to R. C. Ballinger & Company for an addition to the factory of the Brown Instrument Company, Philadelphia, Pa.

This addition will be erected on the land which was purchased last fall at Wayne and Roberts Avenues, adjoining the present building.

The company is now manufacturing pyrometers used in the heat treatment of munitions for the United States Government.

The officers of the company are: Richard P. Brown, president; C. Stanley Hurlbut, vice-president; George W. W. Cornman, secretary, and John P. Goheen, assistant treasurer.

No Extensions for Malden Until Normal Conditions Prevail

The Malden (Mass.) & Melrose Gas Light Company gave official notice that it would be impossible, until the return of normal conditions, to make any extensions to its gas distribution system.

New York & Richmond Company Refuses to Complete Extensions as Directed by Commission

The injunction obtained by the city of New York in April, 1917, restraining the New York & Richmond Gas Company from extending high pressure service to Grant City, New Dorp, Midland Beach and New Dorp Beach, following that company's refusal to accept two inspectors where one "languished" before, supervising on city account the construction of one 6-in. gas main, was vacated on April 2, and held to be illegal.

The communities deprived of gas and its civic organizations supported the gas company in its contention throughout. The Public Service Commission for the First District initiated a hearing upon its own motion, considered the matter and directed the company to complete the extension before May 1, 1918. The company objected and refused to comply with the order on the ground that the commission has no jurisdiction over private streets, and that the extension of gas mains in public thoroughfares subject to heavy changes in grade was a matter for the discretion of the company alone.

Upon this the commission instituted mandamus proceedings against the company, which will be tried during the present term of the Supreme Court. Meantime, since the proceedings began, the company's capital has been exhausted and they are without the necessary funds to complete the extension, either upon their own initiative, commission order or court order.